

EPA Superfund

**Amendment to the
2009 Interim Action Record of Decision**

North Hollywood Operable Unit

San Fernando Valley (Area 1) Superfund Site

Los Angeles County, California

EPA ID: CAD980894893

January 10, 2014



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United States Environmental Protection Agency

Region IX – San Francisco, California

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Acronyms and Abbreviations

1987 ROD	Record of Decision for a Remedial Action for Area 1 of the San Fernando Valley Superfund sites
2009 ROD	EPA Superfund Interim Action Record of Decision: North Hollywood Operable Unit, San Fernando Valley (Area 1) Superfund Site, Los Angeles, California
µg/L	micrograms per liter
ARAR	Applicable or Relevant and Appropriate Requirements
Basin Plan	Water Quality Control Plan, Los Angeles Region
bgs	below ground surface
BOU	Burbank Operable Unit
CCR	California Code of Regulations
CDPH	California Department of Public Health
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CFR	Code of Federal Regulations
COC	contaminant of concern
DTSC	State of California Department of Toxic Substances Control
DWR	Department of Water Resources
EPA	U.S. Environmental Protection Agency
FFS	Focused Feasibility Study, North Hollywood Operable Unit, San Fernando Valley Area 1 Superfund Site, Los Angeles County, California
First Interim Remedy	the existing NHOU interim remedy
gpm	gallons per minute
Honeywell	Honeywell International Inc.
IC	institutional controls
LADWP	Los Angeles Department of Water and Power
LPGAC	liquid phase granular activated carbon
MCL	maximum contaminant level
MCLG	maximum contaminant level goal
NCP	National Oil and Hazardous Substances Pollution Contingency Plan
NDMA	n-nitrosodimethylamine
NHOU	North Hollywood Operable Unit
NL	notification level
NPDES	National Pollutant Discharge Elimination System
NPV	net present value
O&M	operation and maintenance
OEHHA	Office of Environmental Health Hazard Assessment

Amendment to the 2009 Interim Action Record of Decision
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Los Angeles County, California

OU	Operable Unit(s)
PCE	tetrachloroethylene (also known as perchloroethylene)
PHG	California Public Health Goal
PRP	Potentially Responsible Party
RAO	remedial action objective
RCRA	Resource Conservation and Recovery Act
RD	remedial design
ROD	Record of Decision
RODA	Amendment to the 2009 Interim Action Record of Decision
RWQCB	Los Angeles Regional Water Quality Control Board
SCAQMD	South Coast Air Quality Management District
SDWA	Safe Drinking Water Act
SFV	San Fernando Valley
Site	North Hollywood Operable Unit (NHOU) of the San Fernando Valley (SFV) (Area 1) Superfund Site
State	State of California
TBC	To-Be-Considered
TCE	trichloroethylene
TCP	1,2,3-trichloropropane
ULARA	Upper Los Angeles River Area
U.S.C.	United States Code
VOC	volatile organic compound.

Part 1
Declaration

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Part 1 – Declaration

1.1 Site Name and Location

The North Hollywood Operable Unit (“NHO”) of the San Fernando Valley (“SFV”) (Area 1) Superfund Site (“Site”) is located in Los Angeles County, California (CERCLIS ID No. CAD980894893).

1.2 Statement of Basis and Purpose

On September 30, 2009, the United States Environmental Protection Agency (“EPA”) issued an Interim Action Record of Decision (“2009 ROD”), selecting a second interim remedy for the NHO (“2009 Remedy” or “Second Interim Remedy”). This document, the Amendment to the 2009 Interim Action Record of Decision (“RODA”), amends the 2009 ROD. In doing so, it leaves the groundwater extraction and treatment system selected in the 2009 ROD unchanged, but adds a second end-use option (re-injection), which will allow for remedy implementation with an end use that either delivers the treated water to the Los Angeles Department of Water and Power (“LADWP”) for use in its domestic water supply system (as selected in the 2009 ROD) or re-injects it back into the aquifer.

The 2009 Remedy, in combination with the RODA that adds a second end-use option (together referred to as the “Amended Remedy”), was chosen in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (“CERCLA”), as amended by the Superfund Amendments and Reauthorization Act, and in a manner that is not inconsistent with the National Oil and Hazardous Substances Pollution Contingency Plan (“NCP”). The decision to amend the 2009 Remedy is based on the information available in the administrative record for the Site. The RODA has been prepared following the procedures specified in CERCLA Section 117 and Section 300.435(c)(2)(ii) of the NCP. In accordance with Section 300.825(a)(2) of the NCP, this RODA will become part of the administrative record for the site. The State of California (“State”) concurs with the Amended Remedy.

The 2009 ROD specified that the end use for groundwater treated by the Second Interim Remedy would consist of delivery to LADWP for use in its domestic water supply system. EPA has concluded that re-injection of the treated groundwater might be necessary if LADWP and the NHO potentially responsible parties (“PRPs”) are unable to reach an agreement that is acceptable to EPA regarding terms for delivery and acceptance of the treated water. The Amended Remedy, which allows re-injection of treated groundwater back into the SFV groundwater aquifer, ensures that EPA has the flexibility to design the most effective remedy and implement that remedy without significant delay in the event that LADWP and the NHO PRPs are unable to reach agreement. Although this RODA allows re-injection as an additional end-use option, it does not specify which end use will be implemented. Consequently, both the drinking water and the re-injection end uses are considered part of EPA’s Preferred Alternative in the Amended Remedy.

Consistent with the Second Interim Remedy, the scope of the Amended Remedy does not include restoration of the aquifer (i.e., removal of all manmade contaminants), in part because additional data are needed in some areas of the aquifer where the extent of contamination must be better defined before EPA can determine what additional actions, if any, are needed to address these other areas of groundwater contamination. In the meantime, EPA considers it important to implement the Amended Remedy as soon as practicable in order to prevent further migration of the known high-concentration contaminant plumes, as described above, and to collect additional data to evaluate the need for (and scope of) further action.

1.3 Assessment of the Site

EPA has determined that hazardous chemicals have been released into groundwater within the NHOU, and that a substantial threat of release to groundwater still exists. The response action selected in this RODA is necessary to ensure that the groundwater extraction and treatment components of the 2009 Remedy can be implemented and that the public health or welfare or the environment can be protected from actual or threatened releases of hazardous substances into the environment.

1.4 Description of the Amended Remedy

The Amended Remedy includes the groundwater extraction and treatment technology, institutional controls ("ICs"), and groundwater monitoring selected in the 2009 Remedy, and provides an additional end-use option (re-injection) that will allow for the remedy to be implemented by either delivering the treated water to LADWP for use in its domestic water supply system (as selected in the 2009 ROD) or re-injecting it back into the aquifer.

The eastern region of the SFV is characterized by a continuous plume of volatile organic compound ("VOC") contamination that starts in the SFV (Area 1) Superfund Site, and continues downgradient in a generally southeast direction through the SFV (Area 2 and Area 4) Superfund Sites. The NHOU comprises the western portion of Area 1; to the east of the NHOU, still within Area 1, is the Burbank Operable Unit ("BOU"), where an interim pump-and-treat remedy has been in place and operating since 1996. In the future, following additional plume characterization, evaluation of the performance of the Amended Remedy, and an evaluation of the existing BOU remedy, EPA will select a final remedy for the SFV (Area 1) Superfund Site.

1.5 Statutory Determinations

The Amended Remedy, implementing either end-use option, is protective of human health and the environment, complies with federal and State requirements that are applicable or relevant and appropriate to the remedial action, is cost effective, and utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable.

The Amended Remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants through treatment), in accordance with CERCLA §121.

Because hazardous substances, pollutants, or contaminants have continued to be present on-site (i.e., in groundwater) above levels that allow for unlimited use and unrestricted exposure since the NHOU First Interim Remedy was implemented in 1989, EPA has conducted five statutory five-year reviews at the NHOU pursuant to CERCLA §121. Because the Amended Remedy will also result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure, a statutory review will be conducted within five years after initiation of the Amended Remedy to ensure that it is, or will be, protective of human health and the environment.

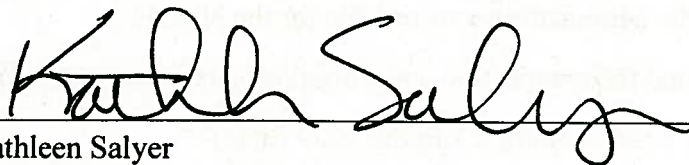
1.6 ROD Certification Checklist

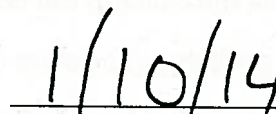
The following information is presented in the Decision Summary section (Part 2 of this RODA). Additional information can be found in the administrative record file for the NHOU.

- Contaminants of concern (“COCs”) and their respective concentrations (see Section 2.5.5)
- Baseline risk represented by the COCs (see Section 2.7 in the 2009 ROD)
- Performance standards established for the COCs and the basis for these levels (see Section 2.5.9)
- Current and potential future beneficial uses of groundwater used in the baseline risk assessment and RODA (see Sections 2.6 and 2.7 in the 2009 ROD and Section 2.5.4 in the RODA)
- Potential groundwater use that will be available at the Site as a result of the selected remedy (see Section 2.5)
- Estimated capital, operation and maintenance (“O&M”), and total present worth costs; discount rate; and the number of years over which the remedy cost estimates are projected (see Section 2.5.6)
- Key factors that led to selecting the amended remedy (i.e., how the selected remedy provides the best balance of tradeoffs with respect to the balancing and modifying criteria) (see Section 2.6)

1.7 Authorizing Signature

This RODA documents an amendment of the Second Interim Remedy, which addresses contaminated groundwater at the North Hollywood Operable Unit of the San Fernando Valley (Area 1) Superfund Site. The Amended Remedy was selected with the concurrence of the California Department of Toxic Substances Control ("DTSC"). The Assistant Director of the Superfund Division (EPA, Region 9) has been delegated the authority to approve and sign this RODA.


Kathleen Salyer
Assistant Director, Superfund Division
California Site Cleanup Branch


Date

Part 2

Decision Summary

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Part 2 – Decision Summary

2.1 Site Name, Location, and Description

The NHOU is one of two geographically defined operable units (“OUs”) within the SFV (Area 1) Superfund Site. The NHOU comprises approximately 4 square miles of contaminated groundwater underlying an area of mixed industrial, commercial, and residential land uses in the community of North Hollywood (a district of the City of Los Angeles). The NHOU is approximately 15 miles north of downtown Los Angeles and immediately west of the City of Burbank, and has approximate site boundaries of Sun Valley and Interstate 5 to the north, State Highway 170 and Lankershim Boulevard to the west, the Burbank Airport to the east, and Burbank Boulevard to the south (see Figure 1).

The EPA is the lead agency for the current and planned future groundwater remedial activities at the NHOU. The EPA’s response activities at the NHOU are and have been conducted under the authority established in the federal Superfund law, CERCLA, as amended, 42 United States Code (“U.S.C.”) §9601 et seq. The lead State agency is the DTSC. The Los Angeles Regional Water Quality Control Board (“RWQCB”) has provided and continues to provide substantial support, particularly with the investigation and cleanup of sources of contamination in the SFV. The expected source of cleanup monies for the NHOU is an enforcement settlement with the PRPs.

2.2 Site Background

This section provides a brief summary of the background of the 2009 Remedy. More details regarding site history, characteristics, risks, remedial action objectives, and alternatives considered are provided in the 2009 ROD.

EPA and LADWP have been involved in addressing groundwater contamination in the NHOU since 1981, when LADWP and the Southern California Association of Governments, funded by EPA, performed a study titled *Groundwater Management Plan—San Fernando Valley Basin*, to investigate widespread groundwater contamination in the SFV. The primary groundwater contaminants of concern in the SFV at that time were trichloroethylene (“TCE”) and tetrachloroethylene (“PCE”; also known as perchloroethylene). These VOCs are commonly used as industrial solvents.

To address the widespread groundwater contamination in the SFV, EPA placed four SFV sites (or Areas) on the National Priorities List in 1986. These four Superfund sites are referred to as:

- SFV Area 1 - North Hollywood, which includes the NHOU and the BOU;
- SFV Area 2 - Crystal Springs, which includes the Glendale North OU, the Glendale South OU, and the Glendale Chromium OU;
- SFV Area 3 - Verdugo;

- SFV Area 4 - Pollock.

EPA has focused its resources on addressing the regional groundwater contamination, while the State (primarily through the RWQCB) has had the primary role for soil cleanup work at the numerous VOC sources that caused the groundwater contamination.

The first interim Record of Decision for the NHO (‘‘1987 ROD’’) was signed in September 1987. The 1987 ROD selected an interim remedy to address VOC-contaminated groundwater in the North Hollywood area (‘‘First Interim Remedy’’). The objective of the selected remedy was to slow down or arrest the migration of the contaminant plume at the North Hollywood-Burbank well field and remove contaminant mass.

Under the First Interim Remedy, the movement of groundwater in the aquifer is controlled by utilizing a series of extraction wells that pump contaminated groundwater from the SFV aquifer. After the water is extracted from the SFV aquifer, it is treated to remove contamination. The NHO treatment plant removes VOCs from the extracted groundwater using air stripping, with granular activated carbon filters used to remove VOCs from the process air before it is discharged to the atmosphere. The treated water meets drinking water standards for COCs and is delivered via pipeline to the LADWP water supply system, where it is blended with water from other sources and distributed through the water supply system for the City of Los Angeles.

The First Interim Remedy has limited contaminant migration and removed contaminant mass from groundwater in the NHO. However, changing groundwater conditions in the aquifer and the discovery of VOC contamination in new areas of the aquifer beneath North Hollywood limit the ability of the First Interim Remedy to fully contain the VOC plume. In addition, emerging contaminants, including hexavalent chromium and 1,4-dioxane, in excess of the State maximum contaminant level (‘‘MCL’’) for total chromium and the California Department of Public Health (‘‘CDPH’’) notification level (‘‘NL’’) for 1,4-dioxane impacted or threatened to impact a number of NHO extraction wells. Chromium contamination in the NHO is shown in Figure 1. In response to the continued migration of VOC-contaminated groundwater and the presence of chromium and other emerging contaminants in the NHO, EPA conducted a Focused Feasibility Study (‘‘FFS’’), completed in 2009, to evaluate alternatives for improving the groundwater remedy. The FFS presented a range of alternatives for addressing the contaminants in groundwater, as well as options for the end use of the treated water.

The Second Interim Remedy, selected in the 2009 ROD, includes construction of new extraction wells, chromium and 1-4 dioxane treatment, expanded VOC treatment, and continued delivery of the treated water to LADWP’s municipal water supply system.

2.3 Community Participation

After listing the SFV Area 1 Superfund Site on the NPL, EPA developed a Community Involvement Plan that outlined the types of activities envisioned to keep the local community informed. Throughout its involvement in the SFV, EPA has kept State agencies, cities, businesses, residents, and property owners in and near the SFV Superfund sites informed of its activities and the results of its studies via periodic newsletters. These newsletters and other

documents referred to in this RODA are available to the public as part of the Administrative Record file at the EPA Region 9 Superfund Records Center in San Francisco, California. The Administrative Record is also available for public review at the following information repositories:

- City of Los Angeles Central Library, Science & Technical Department: 630 West 5th Street, Los Angeles, CA, 90071
- North Hollywood Regional Branch Library, 5211 Tujunga Avenue, North Hollywood, CA, 91601
- Burbank Public Library, Central Library, 110 North Glen Oaks Boulevard, Burbank, CA, 91502
- Glendale Public Library, 222 East Harvard Street, Glendale, CA, 91205

The Proposed Plan for the RODA was made available to the public on May 1, 2013, in accordance with 40 Code of Federal Regulations (“CFR”) §300.435(c)(2)(ii). EPA held a public meeting in North Hollywood on June 5, 2013, to present the Proposed Plan for the RODA to the community and other NHOU stakeholders. The public was notified of this meeting through a public notice published in the Los Angeles Daily News on May 15, 2013, a flyer sent to the NHOU mailing list, and an email notice sent to State and local agencies, elected officials, PRPs and other stakeholders. The original public comment period on the Proposed Plan for the RODA was from May 13 to June 13, 2013. An extension to the public comment period was requested by the PRPs shortly after the Proposed Plan was made available, to provide sufficient time for review and preparation of comments; as a result, the public comment period was extended to July 11, 2013. The public was notified of this extension through a public notice published in the Los Angeles Daily News on June 3, 2013, a flyer sent to the NHOU mailing list, and an email notice sent to State and local agencies, elected officials, PRPs and other stakeholders. EPA’s responses to the comments received during this period are included in the Responsiveness Summary, which is Part 3 of this RODA.

2.4 Remedial Action Objectives

The remedial action objectives (“RAOs”) for the Amended Remedy are unchanged from those set forth in the 2009 ROD:

- Contain areas of contaminated groundwater that exceed the MCLs and notification levels to the maximum extent practicable.
- Prevent further degradation of water quality at the Rinaldi-Toluca and North Hollywood West production wells by preventing the migration toward these well fields of the more highly contaminated areas of the VOC plume located to the east/southeast.
- Achieve improved hydraulic containment to inhibit horizontal and vertical contaminant migration in groundwater from the more highly contaminated areas and depths of the aquifer to the less contaminated areas and depths of the aquifer, including the southeast portion of

the NHOU in the vicinity of the Erwin and Whitnall production well fields.

- Remove contaminant mass from the aquifer.

2.5 Amended Remedy

2.5.1 Summary of 2009 Remedy

EPA's selected remedy in the 2009 ROD was FFS Alternative 4a, which included: construction of new extraction wells; modification/rehabilitation of several existing extraction wells; expanded VOC treatment; chromium treatment for extraction wells NHE-1, NHE-2, and two new extraction wells; installation of additional monitoring wells; ICs; and use of the treated water in LADWP's water supply system.

2.5.2 Summary of the Amended Remedy

The Amended Remedy is very limited in its scope; the only component of the 2009 Remedy that is impacted by the RODA is the end use of the groundwater following treatment. Otherwise, the 2009 Remedy is unchanged, including construction of an estimated three new extraction wells; modification/rehabilitation of several existing extraction wells; and expanded VOC and chromium treatment for extraction wells NHE-1, NHE-2, and two of the new extraction wells. Rather than limiting the end use to delivery of water to LADWP following the treatment process selected in the 2009 Remedy, the RODA adds to the remedy the option of re-injecting the treated water back into the aquifer. The exact number, locations, and pumping rates for the groundwater injection wells will be finalized during remedial design ("RD").

2.5.3 Rationale for Amending the 2009 Remedy

Since issuance of the 2009 ROD, EPA has engaged in negotiations with both the NHOU PRPs and LADWP regarding implementation of the 2009 Remedy. As these negotiations have progressed, EPA realized that LADWP and the NHOU PRPs may be unable to reach an agreement that is acceptable to EPA regarding the terms and criteria for delivery and acceptance of treated groundwater for use in LADWP's drinking water supply system. If an acceptable agreement is not reached between LADWP and the PRPs and the treated water cannot be reliably delivered to LADWP, water extracted from all remedy wells will have to be re-injected in order to ensure that the Second Interim Remedy can effectively operate.

2.5.4 Summary Evaluation of the Nine Criteria for the Amended Remedy

Based on the information currently available, EPA believes that the Amended Remedy, incorporating either proposed end-use option, meets the NCP's threshold criteria and provides the best balance of trade-offs when compared to the other alternatives evaluated in the 2009 ROD. The installation of additional extraction wells, modification of existing extraction wells, and expansion of the VOC treatment system will significantly improve plume capture and prevent further degradation of water quality at the Rinaldi-Toluca and North Hollywood West production well fields. Regardless of which end use is implemented, the Amended Remedy will result in permanent and significant reduction in the mobility and volume of VOCs in groundwater in the NHOU. The addition of chromium and 1,4-dioxane treatment at selected

extraction wells will ensure that the Amended Remedy meets all requirements for use of the treated water in LADWP's water supply system or for re-injection, and it will also significantly reduce the possibility that extraction wells would have to shut down or be pumped at decreased rates as a result of increases in chromium concentrations. Delivery of treated water to LADWP would result in significantly lower cost than re-injection. However, if delivery of treated water to LADWP is not possible, then re-injection would be a viable option to meet the RAOs for the Amended Remedy.

If LADWP and the NHOU PRPs, after negotiating in good faith, (1) have not come to an agreement on the terms for the delivery and acceptance of treated groundwater satisfying EPA that the remedy will be able to operate reliably and effectively and (2) such an agreement has not been reached sufficiently far in advance of remedial design completion so that the end use to be implemented can be incorporated into a final design, EPA will make the decision to proceed with re-injection as the end use so that the remedy can be implemented in a timely manner.

2.5.5 Description of the Amended Remedy

The following is a description of the Amended Remedy. Other than the addition of the option to re-inject treated water as an end use, the major components of the Amended Remedy are identical to the 2009 Remedy. All differences between the Amended Remedy and the 2009 Remedy (which are limited to the alternate end-use option) are identified in **bold text**. Figure 2 schematically illustrates the major components assuming implementation of delivery of the treated water to LADWP as the end-use option. Figure 3 schematically illustrates the major components assuming implementation of re-injection as the end-use option. Although the EPA does not expect significant changes to this remedy, there may be some level of modification during the RD and construction processes if implemented under either end-use option. RD and construction of the Amended Remedy is expected to be completed in 2017. Achievement of the RAOs for the Amended Remedy is expected to occur shortly after system operation commences. Because the RAOs are focused primarily on hydraulic containment, the Amended Remedy is expected to continue operating until a final remedy for the NHOU is selected and implemented. For cost estimating purposes, the Second Interim Remedy was assumed in the FFS to operate for 30 years. Any changes to the remedy described in this RODA would be adopted and documented as appropriate and consistent with the applicable regulations.

Institutional Controls

Governmental controls in place in the SFV act as effective ICs to prevent the public's exposure to contaminated groundwater. The primary governmental control is the 1979 Final Judgment in the Superior Court of California, County of Los Angeles, (Superior Court Case No. 650079) in the case titled The City of Los Angeles vs. City of San Fernando, et al. The final judgment created the entity known as "Watermaster" with full authority to administer the adjudication of water rights, under the auspices of the Superior Court.

Under the final judgment, only the cities of Los Angeles, Burbank, and Glendale are permitted to extract groundwater from the SFV Basin ("Basin"). Each of these municipalities administers a public drinking water system, which is regulated and subject to permits issued by the CDPH. These drinking water regulatory controls and the Watermaster's authority to regulate and allocate

water resources ensure centralized control over area groundwater and its use as a drinking water source.

However, certain municipal groundwater-supply pumping scenarios could interfere with the effectiveness of the Amended Remedy under either end-use option. In order to address this issue, an additional IC is necessary, wherein EPA, LADWP, and the NHOU PRPs work together to develop and implement a groundwater management plan that would protect the effectiveness and integrity of the NHOU remedy while being consistent with LADWP's drinking water production requirements. The groundwater management plan is expected to provide for regular sharing of relevant groundwater data and pumping rate projections, planning for groundwater use, and a decision-making process to address any potential conflicts between the LADWP's pumping plans and the performance of the remedy. To ensure that the groundwater management plan and the implementation mechanisms for that plan are an effective IC, a formal agreement is currently being developed between EPA and LADWP.

Groundwater and Treatment System Monitoring

Regardless of which end-use option is implemented, approximately 37 new monitoring wells will be installed. Honeywell International Inc. ("Honeywell") has already installed most of these wells, in coordination with the EPA. **If the re-injection end-use option is implemented, an estimated nine additional monitoring wells will be required in order to monitor impacts on groundwater levels and quality around and downgradient from the injection wells.** Details regarding number and location of additional monitoring wells required for the re-injection end-use option will be developed during the RD process.

Monitoring of groundwater levels and groundwater quality in the monitoring wells will allow for evaluation of contaminant plume migration and the effectiveness of the selected remedial actions. The specific monitoring objectives that were used to develop a modified groundwater monitoring network as part of the Amended Remedy include the following:

- Fill key data gaps to adequately characterize the lateral and vertical extent of contaminant plumes and known hotspot areas and their relationship to known source areas.
- Provide information to monitor the progress of the remedy and to detect the migration of known COCs and emerging chemicals from known plume and hot spot areas.
- Develop the data necessary for evaluating and, as necessary, selecting future additional response actions for areas of the VOC plume that may not be captured by the Amended Remedy.

Groundwater monitoring within the NHOU is expected to include continued sampling and analysis of the new and existing EPA monitoring wells in the NHOU, selected facility monitoring wells, LADWP production wells, and extraction wells in the North Hollywood area for VOCs, chromium, emerging chemicals, and parameters indicative of geochemical conditions that may affect chromium speciation and transport.

The future sampling regimen for the new and existing monitoring wells will be determined during testing. The ongoing Basin-wide sampling program includes:

- Monthly sampling at the extraction wells and quarterly or annual sampling at the selected monitoring and production wells for VOCs, hexavalent chromium, 1,4-dioxane, and 1,2,3-trichloropropane ("TCP").
- Annual sampling of the extraction wells, selected monitoring wells, and selected production wells for dissolved metals (including total chromium), n-nitrosodimethylamine ("NDMA"), perchlorate, nitrate, common anions, alkalinity, and total dissolved solids.

Depending on the analytical results for groundwater samples collected from the new monitoring wells, construction of additional monitoring wells may be required to further delineate contaminant plumes or determine the locations for continuing sources of groundwater contamination.

Wellhead 1,4-Dioxane Treatment at Extraction Well NHE-2

Wellhead treatment for 1,4-dioxane will occur at extraction well NHE-2, where concentrations ranging from 4 to 9 micrograms per liter ("µg/L") have been detected since 2006 (the CDPH notification level for 1,4-dioxane is 1 µg/L). The treatment technology selected is the ultraviolet light and hydrogen-peroxide advanced oxidation process because it provides the most flexibility for future process modifications; however, during design, another treatment option may be selected. The 30-year O&M period for treatment of VOCs at the NHOU is assumed to also apply to wellhead 1,4-dioxane treatment at extraction well NHE-2. The estimated O&M duration will be re-evaluated if 1,4-dioxane concentrations change significantly during this period.

Replace Existing Extraction Well NHE-1

To achieve the required hydraulic containment under the Amended Remedy, replacement of existing extraction well NHE-1 with a deeper well of similar construction will be necessary. The target screened interval for a replacement for extraction well NHE-1 is from 190 to 401 feet; however, the screened interval may be adjusted during the RD phase, depending on results of future groundwater level and quality monitoring.

Replace or Repair and Modify Existing Extraction Wells NHE-2, NHE-4, and NHE-5

Replacement of extraction wells NHE-2, NHE-4, and NHE-5 with deeper wells of similar construction will likely be necessary to achieve the required hydraulic containment under the Amended Remedy. Target screened intervals for these wells are as follows:

- NHE-2: 190 to 390 feet below ground surface ("bgs")
- NHE-4: 180 to 400 feet bgs
- NHE-5: 180 to 415 feet bgs

Similar to extraction well NHE-1, the screened intervals for these wells may be adjusted during the RD phase. Alternatively, the existing wells could remain active in their present configuration, and wells with deeper screened intervals could be constructed adjacent to each existing well. These paired (deeper) wells would also be connected to the NHOU treatment plant. The pumping rates at each extraction well pair could be adjusted, depending on the depth to the water table, to maximize containment of the most contaminated aquifer zone.

Rehabilitate Existing Extraction Wells NHE-3, NHE-6, NHE-7, and NHE-8

Extraction wells NHE-3, NHE-6, NHE-7, and NHE-8 are screened at appropriate depths for plume containment and have been able to pump at or near their design pumping rates for most of the operational history of the NHOU treatment system. They are not expected to require replacement or modification at present. However, routine repair or replacement of pumps and ancillary equipment will be required as part of an ongoing O&M program to maintain design pumping rates. To ensure optimal long-term performance of these wells, it is assumed they will be rehabilitated using swabbing, surging, sand bailing, and over-pumping techniques. Additional rehabilitation efforts (e.g., acid flushing or jetting) will also be considered on a case-by-case basis, depending on results of the initial rehabilitation efforts.

Construct New Extraction Wells

Preliminary computer modeling conducted during the FFS concluded that three new extraction wells are necessary to further limit contaminant migration and to improve contaminant mass removal. A new pipeline will be required to connect the new extraction wells to the NHOU treatment plant. The exact number, location, and pumping rates for these wells are estimated and will be finalized during RD. Based on the preliminary computer modeling, these new wells ("New Northwestern Wells") should be located northwest of the existing NHOU treatment system in locations (see Figure 4) selected to prevent VOC and chromium migration toward the Rinaldi-Toluca well field and the western portion of the North Hollywood well field. The modeling also suggested that each of the New Northwestern Wells should pump at a maximum rate of 420 gallons per minute ("gpm") (350 gpm long-term average) in order to achieve the containment objective. Screened intervals for these wells are expected to be approximately 220 to 420 feet bgs, but actual intervals, as well as the number and location of the New Northwest Extraction wells, may be revised during the RD phase. Pumping rates and schedules for these wells should be optimized periodically during implementation of the Amended Remedy to achieve the desired capture zones, in consideration of pumping rates and drawdown resulting from the southern production wells in the Rinaldi-Toluca well field. Pumping rates for the three New Northwestern Wells will be evaluated and modified, if necessary, to maximize effectiveness and efficiency of the Amended Remedy. Depending on groundwater conditions (e.g., hydraulic gradients) in the NHOU, which can change on a seasonal to annual basis, it may be beneficial to temporarily reduce or stop pumping from these wells periodically. A plan for optimizing pumping rates of the NHOU extraction wells will be developed as part of the RD process.

Treatment of VOCs in Extracted Groundwater

Expansion of VOC treatment capacity at the NHOU will be necessary to treat the volume of groundwater produced by the existing NHOU extraction wells and the proposed additional extraction wells. The existing NHOU treatment plant will be augmented to accommodate peak and average pumping rates of 3,600 and 3,050 gpm respectively, and for peak VOC concentrations up to 650 µg/L of TCE and 100 µg/L of PCE. The existing air stripper will be refurbished and a second air stripper, similar in capacity to the original, will be installed and operated in parallel with the existing system. The combined maximum capacity of the two parallel air strippers will be 4,800 gpm or more at the anticipated influent VOC concentrations, allowing expansion of the extraction well network or pumping rates in the future, if necessary.

With air stripping as the primary VOC treatment process, the VOC treatment train should include the following major components:

- The air stream exiting the air stripper contains TCE and PCE and must be treated using vapor-phase granular activated carbon vessels (or an alternative technology) to remove the TCE and PCE before the air is discharged to the atmosphere.
- Untreated influent, treated effluent, and air exiting the air stripper at the NHOU treatment plant must be monitored to ensure compliance with permit requirements, ARARs, and LADWP policies.
- If delivery of treated water to the LADWP is implemented as the end-use option, a secondary VOC treatment system (such as liquid phase granular activated carbon ["LPGAC"]) is required downstream from the air strippers to meet the "double barrier" VOC treatment requirement of CDPH for delivery to a drinking water supply. LPGAC would have the additional benefit of also removing VOCs that are not readily removed by the air stripping process, most notably TCP. TCP is not currently detected in the influent to the existing NHOU extraction and treatment system, but has been detected in groundwater within the NHOU at concentrations exceeding the notification level of 0.005 µg/L. **"Double-barrier" treatment would not be necessary if the re-injection end-use option is implemented.**

Wellhead Chromium Treatment at Extraction Well NHE-2

Ex situ treatment of chromium will be required at extraction well NHE-2. In the FFS, ferrous iron reduction with microfiltration was identified as the preferred technology for a wellhead treatment system (and used for the costing). Alternatively, an anion-exchange-based treatment process could be installed, if it can be demonstrated during RD that the process is effective and does not produce excessive NDMA or other problematic organic compounds.

Ferrous iron reduction decreases total chromium concentrations by chemically reducing hexavalent chromium to trivalent chromium and co-precipitating the trivalent chromium with ferric iron. The ferric iron and trivalent chromium co-precipitate is flocculated and removed using a conventional clarifier and media filter polishing or a microfilter. The key components of a ferrous iron reduction and filtration system include:

1. A series of reactors for ferrous iron reduction of hexavalent chromium to trivalent chromium.
2. A microfilter system coupled with a backwash system that removes the ferric iron and trivalent chromium precipitate (solids).
3. A batch-thickening and dewatering system that receives the resulting solids sludge.

The residual sludge is expected to be disposed of at an approved off-site facility, either a Resource Conservation and Recovery Act ("RCRA")-permitted facility or perhaps a reclamation facility.

Anion exchange decreases total chromium concentrations by exchanging hexavalent chromium oxy-anions for chloride anions using a bed of selective ion exchange resins. The ion exchange resin is regenerated off-site by a vendor service. The major components of an anion exchange system

for the NHOU plant would be three ion exchange adsorber vessels and a backwash system. The backwash system would remove broken resin beads and trace suspended solids and it recovers backwash water. Disposal of backwash solids as a wet sludge is assumed. Similar to the ferrous-iron reduction system for chromium treatment, an anion-exchange system could be scaled up or down in capacity to accommodate a changing number of extraction wells or concentrations requiring treatment.

A peak pumping rate of 300 gpm (250 gpm average long-term flow rate) was assumed in the FFS for chromium treatment at extraction well NHE-2. It is assumed the peak chromium concentration in the influent to the wellhead treatment system would be 600 µg/L (1.5 times the peak concentration detected at extraction well NHE-2) and would require treatment to 5 µg/L or less. The 30-year O&M period for treatment of VOCs at the NHOU is assumed to also apply to wellhead chromium treatment at extraction well NHE-2. The estimated O&M duration will be re-evaluated if chromium concentrations change significantly.

Honeywell is currently designing both the chromium treatment for extraction well NHE-2 that was selected in the 2009 ROD as well as an alternative treatment system for chromium at extraction well NHE-2 pursuant to an administrative order on consent with EPA (Docket No. EPA- 2012-04). If EPA approves Honeywell's alternate design for chromium treatment at well NHE-2, it will be incorporated into the Amended Remedy and it, rather than the treatment selected for well NHE-2 in the 2009 ROD, is likely to be implemented as part of the final design.

Ex Situ Chromium Treatment for Extraction Wells NHE-1, NEW-2, and NEW-3

Ex situ treatment of chromium using the ferrous iron reduction with microfiltration process described above was assumed to be implemented in the FFS for the combined flow from three extraction wells at the NHOU groundwater treatment facility (see previous section for details of this treatment method). This system would be sized to treat the combined influent from extraction well NHE-1 and new extraction wells NEW-2 and NEW-3 (a peak combined pumping rate of 1,100 gpm). Alternatively, an anion-exchange-based treatment process could be installed, similar to the option assumed for wellhead treatment at extraction well NHE-2, as described above. The 30-year O&M period for treatment of VOCs at the NHOU also applies to *ex situ* chromium treatment.

End-Use Option 1: Delivery of Treated Groundwater to LADWP

Use of the NHOU treated water in LADWP's drinking water supply requires compliance with federal and State drinking water standards, including the *Policy Guidance for Direct Domestic Use of Extremely Impaired Sources*, CDPH Policy Memorandum 97-005 ("97-005"), which establishes a specific process for the evaluation of impaired water sources before they can be approved for use as drinking water.

Off-site Requirements: All CDPH and LADWP treatment levels or standards, including those identified through the 97-005 process, that apply to COCs must be met by the Amended Remedy in order to deliver the NHOU treated water to LADWP for use in its domestic water supply. Because these treatment levels and standards are off-site drinking water requirements, they are not ARARs. However, they must be met in order to comply with this end-use option, and therefore, are incorporated into this ROD as enforceable standards. Because they are not ARARs,

off-site requirements that change over time must be met in order to comply with the LADWP-delivery end-use option. Currently, the concentrations of NDMA, TCP, perchlorate, and 1,4-dioxane in NHOU groundwater are sufficiently low that treatment is only needed for 1,4-dioxane at extraction well NHE-2. If, during RD, concentrations are found to be increasing at any of the extraction wells, such that the performance standard is exceeded at the compliance point, additional well-head treatment may be necessary.

End-Use Option 2: Re-injection of Treated Groundwater

Re-injection of treated groundwater from the existing and planned new NHOU extraction wells would require an estimated six injection wells and associated pipelines, in addition to the nine additional new monitoring wells discussed above. The potential configuration of the injection wells, treatment system components, and ancillary equipment are discussed in the FFS, and are shown schematically on Figure 3. The injection wells would most likely be located north (upgradient) of the NHOU extraction wells, as shown on Figure 4. In this configuration, the treated groundwater would be re-injected into the aquifer at the northern boundary of the VOC and chromium plumes, which would supplement the hydraulic gradient driving contaminated groundwater toward the extraction wells. Because extracted groundwater would still be treated to remove contaminants (VOCs, chromium, and 1,4-dioxane) under this alternate end use scenario, both wellhead treatment and a central VOC treatment system will still be necessary, although redundant VOC treatment would no longer be required.

Performance standards for the re-injection end-use option would be established during RD, based on the injection locations and discussions with the RWQCB, which regulates groundwater injection. Treatment would need to comply with the California Antidegradation Policy. The treatment levels would be dependent on the location(s) ultimately selected for re-injection, and would be selected such that re-injection would not degrade groundwater quality at the injection location(s).

Because the extracted and treated groundwater would no longer be delivered to LADWP for blending and municipal use under the re-injection option, existing remedy components constructed on LADWP property may need to be replaced with new components constructed elsewhere by the PRPs. Alternatively, the land containing the existing components could potentially be purchased or leased from LADWP. For the purpose of estimating costs in the FFS, EPA assumed that the following existing remedy components would be replaced with new, equivalent components:

- The eight existing NHOU extraction wells (NHE-1 through NHE-8)
- The pipeline that conveys groundwater extracted by the eight existing NHOU extraction wells to the existing NHOU treatment system
- The existing NHOU treatment system

2.5.6 Summary of the Estimated Remedy Costs

Table 1 summarizes the estimated capital, O&M, and present worth costs of the major components of the Amended Remedy, including costs for the two distinct end-use options. These cost estimates were developed for the FFS. A detailed breakdown of these costs is provided in Appendix D of the FFS. The information in this cost estimate summary table is based on the best available information regarding the anticipated scope of the remedial alternative. Changes in the cost elements are likely to occur as a result of new information and data collected during RD of the Amended Remedy. Major changes, if they were to occur, would be adopted and documented as appropriate. As is the practice at Superfund sites, these cost estimates are based on an expected accuracy range of -30 to +50 percent of actual costs.

2.5.7 Expected Outcomes of the Amended Remedy

The expected outcomes of the Amended Remedy would be identical under either end-use option and have not changed from the expected outcomes listed in the 2009 ROD. Improvements to the existing NHOU extraction wells and construction of new extraction wells will result in improved hydraulic containment under the expected future pumping scenarios for water supply in the eastern SFV. The goal of the remedy is to improve hydraulic containment and to control migration of the contaminated plume in excess of MCLs. The Amended Remedy will prevent groundwater with the highest contaminant concentrations from migrating to the nearby Rinaldi-Toluca and North Hollywood West production wells and areas of the aquifer with significantly lower contaminant concentrations. As a result, water-supply wells screened in areas or depth intervals of the aquifer that contain small or no detectable concentrations of the COCs are expected to continue operating without further restrictions caused by increasing contaminant levels.

Because the Amended Remedy is for containment and not restoration, no final cleanup standards have been established for restoration of groundwater. This means that at least a portion of the shallow and deep zones upgradient of the compliance wells and any associated extraction systems will likely remain contaminated and unusable for a considerable length of time.

Table 1. Cost Estimate Summary for the Amended Remedy

ComponentNotes and Assumptions			LADWP-Delivery End-Use Option (Alt. 4a)			Re-injection End-Use Option (Alt. 4b)		
			Capital Cost ^a	Annual O&M Cost ^b	NPV ^c	Capital Cost ^a	Annual O&M Cost ^b	NPV ^c
1a	Groundwater monitoring—hydraulic containment (both end-use options)	Install 37 new monitoring wells and periodically sample existing and planned monitoring wells, production wells, and extraction wells (includes quality assurance/quality control samples)	\$6,980,000	\$758,000	\$16,379,200	\$6,980,000	\$758,000	\$16,379,200
1b	Groundwater monitoring—re-injection impacts (re-injection option)	Install and periodically sample nine additional new monitoring wells specifically for effects of re-injection	N/A	N/A	N/A	\$1,740,000	\$86,000	\$2,806,400
2a	Groundwater extraction from eight existing NHOU extraction wells (LADWP-delivery option)	Deepen four existing extraction wells, rehabilitate four existing extraction wells, and operate all eight extraction wells at design pumping rates (2,000 gpm combined average flow, 2,400 gpm peak)	\$2,740,000	\$527,000	\$9,274,800	N/A	N/A	N/A
2b	Groundwater extraction from eight replacement NHOU extraction wells (re-injection option)	Purchase or replace eight existing extraction wells and operate at design pumping rates	N/A	N/A	N/A	\$13,470,000	\$527,000	\$20,004,800
3	Groundwater extraction from three new extraction wells (both end-use options)	Install three new extraction wells and new pipeline to NHOU treatment plant, operate new extraction wells (1,050 gpm combined average flow, 1,200 gpm peak)	\$3,770,000	\$213,000	\$6,411,200	\$3,770,000	\$213,000	\$6,411,200
4a	Primary VOC treatment—air-stripping (LADWP-delivery option)	Construct and operate second air stripper, and use existing air stripper at design rate (includes refurbishment at year 15)	\$1,908,140	\$599,000	\$9,335,740	N/A	N/A	N/A

Table 1. Cost Estimate Summary for the Amended Remedy

Component	Notes and Assumptions	LADWP-Delivery End-Use Option (Alt. 4a)			Re-injection End-Use Option (Alt. 4b)		
		Capital Cost ^a	Annual O&M Cost ^b	NPV ^c	Capital Cost ^a	Annual O&M Cost ^b	NPV ^c
4b Primary VOC treatment—air stripping (re-injection option)	Construct and operate two new air strippers (assume existing air-stripper on LADWP property must be replaced, and new air strippers constructed on purchased property)	N/A	N/A	N/A	\$7,598,140	\$599,000	\$15,025,740
5 Secondary VOC treatment—LPGAC (LADWP-delivery option)	Construct and operate two new LPGAC treatment units in parallel downstream from air strippers (redundant VOC treatment)	\$2,870,000	\$576,000	\$10,012,400	N/A	N/A	N/A
6 Interim wellhead treatment for 1,4-dioxane and chromium at extraction well NHE-2 (both end-use options)	Performed prior to completion of Amended Remedy; operate at 190 gpm for 3 years	\$4,130,000	\$790,000	\$6,199,800	\$4,130,000	\$790,000	\$6,199,800
7 Expand wellhead treatment for chromium at extraction well NHE-2 (both end-use options)	Expand interim wellhead treatment system for chromium at extraction well NHE-2 (to 250 gpm average flow, 300 gpm peak) following construction of Amended Remedy; operate for 30 years	\$3,650,000	\$861,000	\$14,326,400	\$3,650,000	\$861,000	\$14,326,400
8 Chromium treatment for combined flow from NHE-1 and two new extraction wells (both end-use options)	Single treatment unit designed for 950 gpm average flow, 1,100 gpm peak	\$9,410,000	\$1,691,000	\$30,378,400	\$9,410,000	\$1,691,000	\$30,378,400
9 Expand wellhead treatment for 1,4-dioxane at extraction well NHE-2 (both end-use options)	Expand interim wellhead treatment system for 1,4-dioxane at NHE-2 (to 250 gpm average flow, 300 gpm peak) following completion of Amended	\$640,000	\$428,000	\$4,708,080	\$640,000	\$428,000	\$4,708,080

Table 1. Cost Estimate Summary for the Amended Remedy

ComponentNotes and Assumptions			LADWP-Delivery End-Use Option (Alt. 4a)			Re-injection End-Use Option (Alt. 4b)		
			Capital Cost ^a	Annual O&M Cost ^b	NPV ^c	Capital Cost ^a	Annual O&M Cost ^b	NPV ^c
options)		Remedy; operate for 30 years						
10	CDPH 97-005 process (LADWP-delivery option)	Required to use treated water from NHOU as part of LADWP's water supply	\$750,000	\$0	\$750,000	N/A	N/A	N/A
11	Groundwater injection (re-injection option)	Install and operate six new injection wells, construct and maintain 9,000-foot-long pipeline from NHOU treatment plant to new injection wells	N/A	N/A	N/A	\$14,680,000	\$263,000	\$17,941,200
TOTALS:			\$36,848,140	\$6,443,000	\$107,776,020	\$66,068,140	\$6,216,000	\$134,181,220

^a Capital cost estimates are not discounted because the construction work will be performed in the first year.

^b O&M costs include labor and expenses for repairs, energy for operation, and other costs that accrue on a continuous or periodic basis during an average year of system operation.

^c Net present value estimates assume a 7% discount rate on annual O&M costs for a 30-year period for all remedial components.

Notes:

Alt. = Alternative

N/A = Not applicable

Costs for monitoring the treatment system performance are included in each alternative above.

2.5.8 Applicable or Relevant and Appropriate Requirements

The Amended Remedy is expected to comply with all federal and State Applicable or Relevant and Appropriate Requirements ("ARARs") except for 40 CFR §300.430(e)(2)(i)(A), which requires that the contaminant levels of the groundwater that remains in the aquifer be reduced below the selected applicable or relevant and appropriate cleanup standard, which generally is the MCL for drinking water. Because this is an interim action for containment of groundwater contamination, EPA has not established chemical-specific ARARs for restoration of groundwater remaining on-site. EPA is waiving this ARAR pursuant to CERCLA §121(d)(4)(A), 42 U.S.C. §9621(d)(4)(A), and 40 CFR §300.430(f)(1)(ii)(C), which allows EPA to select a remedy that does not achieve an ARAR when the remedial alternative selected is an interim measure that will become part of a total remedial action that will attain ARARs. EPA's waiver of the aquifer cleanup standard does not apply to water extracted from the aquifer and either delivered to LADWP for use as drinking water or re-injected back into the aquifer; all extracted and treated water is expected to comply with ARARs, including the MCLs for drinking water.

2.5.9 Amended Remedy Performance Standards

Performance standards for treated groundwater under both end-use options are summarized in Table 2.

For the LADWP-delivery end-use option, the current regulatory standards for TCE, PCE, and the other VOC COCs are the State and federal MCLs. Similarly, the current regulatory standard for total chromium is the State MCL of 50 µg/L. Although there is currently no promulgated State or federal MCL for hexavalent chromium, in August 2013, CDPH proposed a draft MCL for hexavalent chromium of 10 µg/L. LADWP has indicated that it will not accept water with hexavalent chromium levels exceeding 5 µg/L for use in its drinking water supply system. Until the MCL is final and/or until LADWP agrees to accept water with hexavalent chromium concentrations up to 10 µg/L, EPA will use LADWP's 5 µg/L voluntary limit as a performance standard for the drinking water end-use option. If delivery of the treated water to LADWP is implemented as the end-use option, when California finalizes its MCL for hexavalent chromium, a different level of chromium treatment may be required in order to ensure that the treated water continues to meet requirements for drinking water. No State or federal MCLs have been promulgated for TCP, 1,4-dioxane, or NDMA. For these emerging chemicals, which lack MCLs, EPA is treating the CDPH notification levels, which are health-based advisory levels for drinking water use, as criteria to be considered in setting alternative performance standards for extracted groundwater in the NHOU for the drinking water end-use option. Notification levels are established as precautionary measures for contaminants that may be considered candidates for establishment of MCLs.

Under the re-injection end-use option for treated water, the performance standard for COCs will be the lower of the MCL or a level that will comply with the California Anitdegradation Policy for groundwater. The performance standard for non-COCs and for contaminants that do not have MCLs is the level that will comply with the California Anitdegradation Policy for groundwater. The levels will be determined through discussion with the RWQCB during RD, if the re-injection end-use option is implemented. The treatment levels will be dependent on the location(s) ultimately selected for re-injection, and will be selected such that re-injection would

not degrade groundwater quality at the injection location(s). Compliance with the California Antidegradation Policy is assumed to be achieved by meeting the substantive requirements of the RWQCB's "*Order No. R4-2007-0019, Revised General Waste Discharge Requirements for Groundwater Remediation at Petroleum Hydrocarbon Fuel, Volatile Organic Compound and/or Hexavalent Chromium Impacted Sites*" (Order No. R4-2007-0019), which applies to re-injection of groundwater extracted and treated by the Amended Remedy.

Table 2. Performance Standards for COCs in Extracted and Treated Groundwater

COC	Federal MCL (µg/L)	State MCL (µg/L)	CDPH NL (µg/L)	LADWP-Delivery End-Use Option		Re-injection End-Use Option	
				Basis for Performance Standard	Performance Standard ^a (µg/L)	Basis for Performance Standard	Performance Standard ^b (µg/L)
TCE	5	5	None	Federal MCL	5	Federal MCL and California Anti-Degradation Policy	TBD (5 or less)
PCE	5	5	None	Federal MCL	5	Federal MCL and California Anti-Degradation Policy	TBD (5 or less)
1,1-Dichloroethane	5	5	None	Federal MCL	5	Federal MCL and California Anti-Degradation Policy	TBD (5 or less)
1,2-Dichloroethane	0.5	0.5	None	Federal MCL	0.5	Federal MCL and California Anti-Degradation Policy	TBD (0.5 or less)
1,1-Dichloroethene	6	6	None	Federal MCL	6	Federal MCL and California Anti-Degradation Policy	TBD (6 or less)
cis-1,2-Dichloroethene	6	6	None	Federal MCL	6	Federal MCL and California Anti-Degradation Policy	TBD (6 or less)
1,1,2-Trichloroethane	5	5	None	Federal MCL	5	Federal MCL and California Anti-Degradation Policy	TBD (5 or less)
Carbon Tetrachloride	0.5	0.5	None	Federal MCL	0.5	Federal MCL and California Anti-Degradation Policy	TBD (0.5 or less)
Methylene Chloride	5	5	None	Federal MCL	5	Federal MCL and California Anti-Degradation Policy	TBD (5 or less)
Total Chromium	100	50	None	State MCL	50	California MCL and California Anti-Degradation Policy	TBD (50 or less)
Hexavalent Chromium	None	None ^c	None	See footnote "d"	5 ^d	California Anti-Degradation Policy	TBD
Perchlorate	None	6	None	State MCL	6	State MCL and California Anti- Degradation Policy	TBD (6 or less)
TCP	None	None	0.005	CDPH NL	0.005	California Anti-Degradation Policy	TBD

Table 2. Performance Standards for COCs in Extracted and Treated Groundwater

COC	Federal MCL (µg/L)	State MCL (µg/L)	CDPH NL (µg/L)	LADWP-Delivery End-Use Option		Re-injection End-Use Option	
				Basis for Performance Standard	Performance Standard ^a (µg/L)	Basis for Performance Standard	Performance Standard ^b (µg/L)
1,4-Dioxane	None	None	1	CDPH NL	1	California Anti-Degradation Policy	TBD
NDMA	None	None	0.01	CDPH NL	0.01	California Anti-Degradation Policy	TBD

^aUnder the LADWP-delivery end-use option for treated water, the CDPH permitting process may require lower concentrations in the treated effluent.

^b Under the re-injection end-use option for treated water, the performance standard for COCs will be the lower of the MCL or a level that will comply with the California Anti-Degradation Policy for groundwater. The performance standard for non-COCs and for contaminants that do not have MCLs is the level that will comply with the California Anti-Degradation Policy for groundwater. The levels will be determined through discussion with the RWQCB during RD, if the re-injection end-use option is implemented. "TBD" in this column indicates that the performance standard has yet to be determined.

^cIn August 2013, CDPH announced the availability of the proposed 0.010-milligram per liter (10 µg/L) draft MCL for hexavalent chromium for public comment. The final MCL will be adopted after the public review and comment process.

^dBased on discussions with LADWP, it is EPA's understanding that in the absence of a final federal or State MCL for hexavalent chromium, LADWP will continue to use a voluntary cleanup level of 5 µg/L for hexavalent chromium for water it will accept for use in its water supply system. Consequently, under the drinking water end-use option, chromium treatment at the NHOU will be needed so that LADWP's voluntary cleanup level of 5 µg/L can be met.

Note:

TBD = To be determined

For the purposes of determining compliance with the performance standards presented in Table 2, the point of compliance shall be the combined effluent from the NHOU treatment facility, immediately prior to its delivery to the selected end use—the LADWP drinking water system or re-injection system.

2.6 Evaluation of the Nine Criteria/Comparative Analysis of End Uses

The NCP (40 CFR §300.430(e)(9)(iii)) describes the nine CERCLA criteria used to evaluate the alternatives under consideration. The NCP categorizes the nine CERCLA evaluation criteria into three groups: (1) threshold criteria; (2) primary balancing criteria; and (3) modifying criteria. Each category has its own weight when applied to the evaluation of alternatives:

1. Threshold criteria are requirements that each alternative must meet to be eligible for selection as the preferred alternative. Threshold criteria include the overall protection of human health and the environment and compliance with ARARs (unless a waiver is obtained).
2. Primary balancing criteria weigh the effectiveness and cost trade-offs among alternatives. Primary balancing criteria include long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost. The primary balancing criteria are the main technical criteria upon which the evaluation of alternatives is based.
3. Modifying criteria include State and community acceptance, which may be used to modify aspects of the selected alternative presented in the ROD or RODA.

This section provides a comparative analysis of the two end-use options for treated water currently under consideration—delivery to LADWP (the selected end-use option in the 2009 ROD), versus re-injection (the alternative end-use option added to the 2009 Remedy by this RODA)—to evaluate the extent to which each is responsive to the nine CERCLA criteria. A comparative analysis of all the remedial alternatives considered in the FFS can be found in the 2009 ROD.

2.6.1 Overall Protection of Human Health and the Environment

Exposure to contaminated groundwater through the potable water supply is the area of potential human health risk in the NHOU. There are no potentially complete exposure pathways for contaminated groundwater to reach ecological receptors. The Amended Remedy will protect human health and the environment by achieving hydraulic containment, to the extent practicable, of groundwater exceeding the MCLs, including the most significant areas of groundwater contamination in the NHOU, and thereby preventing the highest contaminant concentrations from migrating to the nearby Rinaldi-Toluca and North Hollywood West production wells. Water supply wells, NHOU extraction wells, EPA (remedial investigation) monitoring wells, and facility monitoring wells will be monitored and access to contaminated groundwater will be restricted through ICs. Performance standards for treated groundwater are summarized in Table 2. As set forth in the FFS and 2009 ROD, the Amended Remedy provides the same level of protection to human health and the environment whether the end use for extracted water is

delivery to LADWP for drinking water supply purposes or re-injection of all extracted water into the aquifer.

2.6.2 Compliance with ARARs

As set forth in the FFS and 2009 ROD, both the drinking water delivery end use selected in the 2009 ROD and the alternate re-injection end-use option comply with ARARs. A complete list of all ARARs for the Amended Remedy is provided in Tables 3 and 4. Table 5 summarizes To-Be-Considered (“TBC”) criteria. The primary ARARs identified include the Safe Drinking Water Act (underground injection and MCLs), the RCRA (disposal of spent treatment residuals), California Domestic Water Quality and Monitoring Regulations (State MCLs and monitoring requirements), and the RWQCB Water Quality Control Plan (California Antidegradation Policy).

Because this is an interim action for the containment of groundwater contamination, EPA has not established chemical-specific ARARs for restoration of groundwater. 40 CFR §300.430(e)(2)(i)(A) requires that the contaminant levels in the groundwater that remains in the aquifer be reduced below MCLs. EPA is waiving this ARAR pursuant to CERCLA §121(d)(4)(A), 42 U.S.C. §9621(d)(4)(A), and 40 CFR §300.430(f)(1)(ii)(C), which allow EPA to select a remedy that does not achieve an ARAR when the remedial alternative selected is an interim measure that will become part of a total remedial action that will attain ARARs. EPA’s waiver of the aquifer cleanup standard does not apply to water extracted from the aquifer and delivered to LADWP for use as drinking water or re-injected; all extracted and treated water is expected to comply with MCL ARARs.

2.6.3 Long-term Effectiveness and Permanence

By controlling (to the extent practicable) migration of the groundwater exceeding MCLs, including the most highly contaminated groundwater in the NHOU, the improvements to the extraction and treatment system will prevent the highest contaminant concentrations from migrating to the nearby Rinaldi-Toluca and North Hollywood West production wells. In addition, the treatment system will be effective in removing contaminants from the extracted water. Differences in hydraulic containment and treatment levels under the two end-use options allowed by the Amended Remedy are expected to be small and have an insignificant impact on the long-term effectiveness and permanence of the Amended Remedy. EPA considers both the drinking water delivery end use selected in the 2009 ROD and the alternate end use whereby all extracted water is re-injected to be protective over the long term.

2.6.4 Reduction of Toxicity, Mobility, or Volume through Treatment

Expanded groundwater treatment will reduce the mobility and volume of dissolved-phase VOCs and emerging contaminant concentrations in groundwater, result in the permanent destruction of VOCs and 1,4-dioxane, and reduce the toxicity of chromium by converting it from the hexavalent to the trivalent form. Differences in the treatment levels under the two end-use options allowed by the Amended Remedy are expected to be small and have an insignificant impact on the overall reduction in toxicity, mobility, or volume of contaminants. EPA considers both the drinking water delivery end use selected in the 2009 ROD and the alternate re-injection end-use option to be consistent with EPA’s mandate to reduce toxicity, mobility, or volume through treatment.

Table 3. Chemical-specific Applicable or Relevant and Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
SDWA (2 U.S.C. 300 et seq.)	National Primary Drinking Water Standards, including 40 CFR 141.61 and 40 CFR 141.62	Relevant and appropriate	<p>Chemical-specific drinking water standards and MCLs have been promulgated under the SDWA; MCLGs above zero are considered chemical-specific ARARs under the NCP (40 CFR 300.430(e)(2)(i)(B)). When the MCLGs are equal to zero, which is generally the case for a chemical considered to be a carcinogen, the MCL is considered the chemical-specific ARAR instead of the MCLG (40 CFR 300.430(e)(2)(i)(C)).</p> <p>Established MCLs for COCs are listed in Table 3-4 of the FFS.</p> <p>Performance standards for the SFV treated effluent were established in the 1987 ROD at 5 µg/L for TCE and 4 µg/L for PCE. However, the MCL and performance standard for PCE has since been changed to 5 µg/L. The MCL of 5 µg/L for TCE and PCE will apply to the effluent from the treatment plant.</p> <p>Performance standards for groundwater in the aquifer are not established at this time in any of the alternatives.</p>	<p>Applies to both end uses of treated water—delivery to LADWP and re-injection.</p> <p>The MCLs are ARARs for the purpose of establishing performance standards for the treated water from the NHOU treatment plant, whether it is delivered to LADWP for municipal use or re-injected to the aquifer underlying the SFV.</p> <p>40 CFR 300.430(e)(2)(i)(B) and 40 CFR 300.430(e)(2)(i)(C) require that the remedy selected attain non-zero MCLGs or MCLs for each contaminant if the groundwater is a current or potential drinking water source.</p>
SDWA (42 USC 300 et seq.)	National Primary Drinking Water Standards, including 40 CFR 141, including 40 CFR 141.23 and 40 CFR 141.24	Relevant and appropriate	Requires monitoring to determine compliance with MCLs.	<p>Applies to both end uses of treated water—delivery to LADWP and re-injection.</p> <p>Substantive monitoring requirements in 40 CFR 141.23 and 40 CFR 141.24 are relevant and appropriate, to ensure that treated effluent meets performance standards.</p>
State of California Domestic Water Quality and Monitoring Regulations	California Safe Drinking Water Regulations, including 22 CCR 64431 and 22 CCR 64444	Relevant and appropriate	Contains provision for California domestic water quality; establishes MCLs for primary drinking water chemicals.	<p>Applies to both end uses of treated water—delivery to LADWP and re-injection.</p> <p>The MCLs are ARARs for the purpose of establishing performance standards for COCs in the water extracted from the Basin and treated at the treatment plant.</p>

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
Notes:				
CCR =	California Code of Regulations			
MCLG =	maximum contaminant level goal			
SDWA =	Safe Drinking Water Act			

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
Clean Air Act SCAQMD	Air Pollution Control Equipment Permit 144890 (granted August 29, 1986)	Substantive requirements of the permit are applicable	In California, the authority for enforcing the standards established under the Clean Air Act has been delegated to the State. The program is administered by the SCAQMD in Los Angeles. Permit 144890 (held by LADWP) requires 90 percent removal efficiency for TCE and PCE air emissions and a not-to-exceed level of 2 pounds per day of total VOCs.	<p><i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i></p> <p>The existing system includes use of air stripping technology to remove VOCs from the groundwater. Emissions from the air stripper must meet SCAQMD limits and the other substantive provisions established in the permit.</p> <p>Although a permit is not required for the air stripper pursuant to CERCLA §121(d), LADWP obtained a permit in advance of construction in 1986. According to SCAQMD, the permit from the SCAQMD remains valid, and the emission limits and other substantive requirements in it are applicable.</p> <p>If the air stripping treatment system is modified significantly as part of the selected remedy, the substantive provisions of SCAQMD Rule 1401 (which limits air emissions of identified toxics from new or modified sources) may apply.</p>

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
California Water Code and State Water Resources Control Board Model Well Standards Ordinance (1989)	Division 7, Chapter 10, Section 13700 et seq.	Applicable	The California Water Code requires the State Water Resources Control Board to adopt a model well ordinance implementing the standards for well construction, maintenance, and abandonment contained in the construction requirements for wells, in conformance with DWR Bulletin 74-81. DWR Bulletin 74-90 updates DWR Bulletin 74-81.	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> If the selected alternative involves well construction or maintenance, substantive provisions of this code will be applicable.
SDWA (42 USC 300 et seq.)	Federal Underground Injection Control Plan, 40 CFR 144, including 40 CFR 144.12, 40 CFR 144.13, and 40 CFR 146.10	Applicable	Prohibits injection wells from (1) causing a violation of primary MCLs in the receiving waters and (2) adversely affecting the health of persons. Provides that contaminated groundwater that has been treated may be re-injected into the formation that it was withdrawn from if such injection is conducted pursuant to a CERCLA cleanup and is approved by EPA.	<i>Applies to re-injection end-use option only.</i>
RCRA	RCRA Sections 3020 (a) and (b)	Applicable	RCRA §3020(a) bans hazardous waste disposal by underground injection into a drinking water aquifer (within 0.25 mile of a well) or above such a formation. However, §3020(b) exempts from this ban on re-injection of treated contaminated groundwater if the following criteria are met: (1) the re-injection is part of a response action under CERCLA; (2) the water is treated to substantially reduce	<i>Applies to re-injection end-use option only.</i> The substantive requirements will apply if the extracted groundwater meets the definition of hazardous waste and is re-injected into the aquifer.

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
			hazardous constituents prior to re-injection, and (3) the response action is sufficient to protect human health and the environment upon completion.	
RWQCB Basin Plan	Basin Plan, Chapters 2 and 3	Relevant and Appropriate	The Basin Plan incorporates State Water Resources Control Board Resolution No. 68-16, "Statement of Policy with Respect to Maintaining High Quality of Waters in California." Resolution No. 68-16 requires maintenance of existing State water quality unless it is demonstrated that a change will benefit the people of California, will not unreasonably affect present or potential uses, and will not result in water quality less than that prescribed by other State policies.	<i>Applies to re-injection end-use option only.</i>

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
RWQCB	Order No. R4-2007-0019	Relevant and Appropriate	Describes the circumstances and waste discharge requirements under which groundwater extracted and remediated at petroleum hydrocarbon fuel, VOC, or hexavalent chromium sites in the Los Angeles region can be reinjected into the aquifer, to comply with the California Antidegradation Policy.	<i>Applies to reinjection end-use option only.</i> The selected remedy need only comply with the substantive provisions of the regulations listed in Order No. R4-2007-0019.
California Hazardous Waste Regulations, Generator Requirements	22 CCR 66262.10	Applicable	Lists the sections of California law with which a generator of hazardous waste must comply.	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> The selected remedy need only comply with the substantive provisions of the regulations listed in 22 CCR 66262.10. Each alternative considered in the FFS has the potential to generate hazardous waste. Examples of hazardous wastes generated on-site include: (1) spent granular activated carbon filters from the air stripper, (2) purged water from new or modified wells that meets characteristic waste levels, and (3) well casing soils from new or modified wells that meet characteristic waste levels.
California Hazardous Waste Regulations, Generator Requirements	22 CCR 66262.11	Applicable	Requires waste generators to determine if wastes are hazardous and establishes procedures for such determinations.	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> The substantive requirements will be applicable to management of waste materials generated by a groundwater treatment plant and to any waste

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
California Hazardous Waste Regulations, Generator Requirements	22 CCR 66262.34(a)(1)(A)	Relevant and appropriate	Waste stored on-site should be placed in containers or tanks that are in compliance with California Hazardous Waste Regulations.	generated while installing new wells. <i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> Storage of hazardous waste accumulated on-site must be in compliance with substantive requirements for interim status facilities.
California Hazardous Waste Regulations, Storage of Hazardous Waste	22 CCR 66265.170 et seq. (Article 9) 22 CCR 66265.190 et seq. (Article 10)	Applicable	Regulates use and management of containers, compatibility of wastes with containers, and special requirements for certain wastes.	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> Substantive provisions of Articles 9 and 10 will be applicable if hazardous waste is generated and accumulated on-site.
California Land Disposal Restrictions, Requirements for Generators	22 CCR 66268.3, 22 CCR 66268.7, 22 CCR 66268.9, and 22 CCR 66268.50	Applicable	Compliance with land disposal regulation treatment standards is required if hazardous waste (e.g., contaminated soil) is placed on land. Soil treatability variance may be invoked, in accordance with 40 CFR 268.44 (h)(3) and (4).	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> Hazardous waste hauled off-site must meet "land-ban" requirements.
California Land Disposal Restrictions, Requirements for Generators	22 CCR 66268.1 et seq. (Article 1)	Applicable	Prior to transporting for off-site disposal, hazardous waste must be characterized to determine whether land disposal restriction treatment standards apply and whether the waste meets the treatment standards. This information must be provided to the off-site facility with the first waste shipment.	<i>Applies to both end uses of treated water—delivery to LADWP and re-injection.</i> The substantive requirements will be applicable to management of waste materials generated by a groundwater treatment plant and to any waste generated while installing new wells.
Spent Carbon	40 CFR 268.40	Applicable	Attain land disposal treatment	<i>Applies to both end uses of treated</i>

Table 4. Action-Specific Applicable or Relevant And Appropriate Requirements

Source	Citation	Applicable or Relevant and Appropriate	Description	Findings and Comments
Disposal			standards before putting waste into landfill to comply with land disposal restriction.	<i>water—delivery to LADWP and re-injection.</i> Substantive requirements apply.

Notes:

Basin Plan = Water Quality Control Plan, Los Angeles Region
DWR = Department of Water Resources
NPDES = National Pollutant Discharge Elimination System
SCAQMD = South Coast Air Quality Management District

Table 5. TBC Criteria

Source	Citation	Description	Findings and Comments
California PHGs, California Environmental Protection Agency, and OEHHA	California Calderon-Sher SDWA of 1996, California Health and Safety Code §116365	OEHHA has adopted PHGs for chemicals in drinking water. PHGs are levels of drinking water contaminants at or below which adverse health effects are not expected to occur from a lifetime of exposure.	<i>Applies to LADWP-delivery end-use option only.</i> In the absence of MCLs, the State PHGs adopted by OEHHA have been considered during selection of performance standards for extracted groundwater delivered to LADWP following treatment.
CDPH Drinking Water Notification Levels	California Health and Safety Code §116455	CDPH has established drinking water notification levels (formerly known as action levels) based on health effects, but in some cases they are based on organoleptic (taste and odor) values for chemicals without MCLs.	<i>Applies to LADWP-delivery end-use option only.</i> In the absence of MCLs, the drinking water notification levels established by CDPH have been considered during selection of performance standards for extracted groundwater delivered to LADWP following treatment.

Notes:

PHG = California Public Health Goal

OEHHA = Office of Environmental Health Hazard Assessment

2.6.5 Short-term Effectiveness

The Amended Remedy requires construction of pipelines from the new extraction wells to the NHOU treatment plant and if the re-injection end-use option is implemented, construction of the injection wells and additional pipelines to those wells. No special worker-protection issues or environmental impacts are anticipated as a result of pipeline construction activities nor are any additional risks to the community or construction workers. Construction of the injection wells and additional pipelines for the re-injection end use may require an additional 12 months compared to the LADWP-delivery option. Regardless of which end-use option is implemented, the existing NHOU treatment system will have to be shut down at some point during construction of the Amended Remedy. Following shut down, there is not expected to be any extraction or treatment of groundwater by remedy wells until the Amended Remedy is implemented. Until the existing NHOU extraction and treatment system is shut down, it is expected that the contaminant concentrations in the treatment plant effluent will remain below the MCLs and notification levels. As a result, EPA considers both the end-use options in the Amended Remedy to be equally protective of human health in the short term.

2.6.6 Implementability

Permitting, construction, and operation of the injection wells and new pipelines required if re-injection is selected as the end-use option may add to the complexity of implementing the Amended Remedy compared to implementation of the LADWP-delivery end-use option. However, if delivery of the water to LADWP for use as drinking water is not possible, the alternate end use will be essential to successful remedy implementation. If the re-injection end-use option is implemented, analysis of the administrative details will be conducted during RD. However, significant administrative constraints that would impact implementability are not expected. EPA considers both end-use options to be implementable. However, if LADWP and the PRPs are not able to reach an acceptable agreement in a timely manner, then re-injection may be the only implementable option.

2.6.7 Cost

A summary of the capital, annual O&M, and net present value ("NPV") costs for each alternative is presented in Table 1. These cost estimates are based on a 7% discount rate and 30 year O&M period. Details of the cost estimates for each alternative are provided in Appendix D of the FFS. Although the costs are higher for re-injection, if the option of providing the extracted and treated water to LADWP proves to be infeasible, then the remedy cannot be implemented without another end-use option, and the additional costs will be justified in order to be able to implement a remedy.

2.6.8 State Acceptance

The State has expressed its support for EPA's Preferred Alternative in a concurrence letter dated October 25, 2013.

2.6.9 Community Acceptance

EPA received comments on the Proposed Plan for the RODA from five parties; three of the parties were local community members, one was the LADWP, and one was the engineering firm

conducting the RD on behalf of Honeywell and Lockheed-Martin Corporation. Issues raised by the community members during the public comment period included a question about performance standards for the re-injection end-use option, a concern that air-stripping treatment might discharge chromium into the atmosphere, a preference that groundwater contamination be cleaned quickly, and a preference for implementing the re-injection option to store groundwater for future use.

EPA has addressed all of the significant comments received in Section 3 – Responsiveness Summary. EPA does not believe that any of the issues raised in the comments would result in rejection of the re-injection end-use option for treated water from the Amended Remedy.

2.7 Statutory Determinations

Under CERCLA §121, EPA must select remedies that are protective of human health and the environment, comply with ARARs (unless a statutory waiver is justified), consider the reasonableness of cost for the selected remedy, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ, as a principal element, treatment that permanently and significantly reduces the volume, toxicity, or mobility of hazardous wastes and a bias against off-site disposal of untreated wastes. The following sections discuss how the Amended Remedy meets these statutory requirements.

2.7.1 Protection of Human Health and the Environment

Exposure to contaminated groundwater through the potable water supply is the area of potential human-health risk in the NHOU. There are no potentially complete exposure pathways for contaminated groundwater to reach ecological receptors. The Amended Remedy is protective of human health and the environment, whether the end use for extracted and treated water is delivery to LADWP for drinking water supply purposes or re-injection of all extracted and treated water into the Basin.

2.7.2 Compliance with Applicable or Relevant and Appropriate Requirements

Both the drinking water delivery end use selected in the 2009 ROD and the re-injection end use added by this RODA comply with ARARs. A complete list of all ARARs for the Amended Remedy is provided in Tables 3 and 4. Table 5 summarizes TBC criteria. Because this is an interim action for the containment of groundwater contamination, EPA has not established chemical-specific ARARs for restoration of groundwater.

The ARARs are “frozen” at the time the RODA is signed, but off-site requirements, including requirements applicable to treated water delivered to the drinking water supply, may have to be met in order to deliver the treated water to LADWP (if implemented as the end-use option), regardless of whether those requirements change over time. As a result, if an off-site drinking water requirement changes, the treatment system must meet whichever standard is lower (the performance standard selected in the ROD or the off-site requirement).

No location-specific ARARs were identified for the Site for the 1987 ROD, and none have been identified for the 2009 Remedy or the Amended Remedy.

2.7.3 Cost Effectiveness

In EPA's judgment, the Amended Remedy (under either end-use option) is cost effective and represents a reasonable value for the money to be spent. Section 300.430(f)(ii)(D) of the NCP requires EPA to evaluate the cost of an alternative relative to its overall effectiveness. This was accomplished by evaluating the "overall effectiveness" of the Amended Remedy using either end-use option. Overall effectiveness was evaluated by assessing four of the five balancing criteria in combination (long-term effectiveness and permanence; reduction in toxicity, mobility, and volume through treatment; short-term effectiveness; and implementability). Overall effectiveness was then compared to costs to determine cost-effectiveness. The relationship of the overall effectiveness of the Amended Remedy was determined to be proportional to its costs; hence, this alternative represents a reasonable value for the money spent.

The estimated NPV of the Amended Remedy with delivery of treated water to LADWP as the end-use option is \$108 million. The estimated NPV of the Amended Remedy with re-injection of treated water as the end-use option is \$134 million. Although the costs are higher for re-injection, if the option of providing the extracted and treated water to LADWP is infeasible, the remedy cannot be implemented without another end-use option. Therefore, the additional costs will be justified in order to be able to implement a remedy.

2.7.4 Utilization of Permanent Solutions and Alternative Treatment Technologies to the Maximum Extent Practicable

EPA has determined that the Amended Remedy, including either of the end-use options described in this RODA, represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a practicable manner at the NHOU, until EPA obtains sufficient data to select a final remedy. EPA has also determined that, compared to the other alternatives considered in the FFS or 2009 ROD, implementation of either end-use option under the Amended Remedy will provide the best balance of tradeoffs in terms of the five balancing criteria, while also considering the statutory preference for treatment as a principal element and bias against off-site treatment and disposal, as outlined below:

- **Long-Term Effectiveness and Permanence:** By controlling (to the extent practicable) migration of the groundwater exceeding MCLs, including the most highly contaminated groundwater in the NHOU, the area for potential future residual contamination in groundwater and the vadose zone is limited.
- **Reduction of Toxicity, Mobility, or Volume through Treatment:** Expanded groundwater treatment will reduce the mobility and volume of dissolved-phase VOCs and emerging contaminant concentrations in groundwater, result in the permanent destruction of VOCs and 1,4-dioxane, and reduce the toxicity of chromium by converting it from the hexavalent to the trivalent form.
- **Short-term Effectiveness:** Construction of the injection wells and additional pipelines for the re-injection end use may require an additional 12 months compared to the LADWP-delivery option. Regardless of which end-use option is implemented, the existing NHOU treatment system will have to be shut down at some point during construction of the Amended

Remedy. Until the existing NHOU extraction and treatment system is shut down, it is expected that the contaminant concentrations in the treatment plant effluent will remain below the MCLs and notification levels. As a result, EPA considers both the end-use options in the Amended Remedy to be equally protective of human health in the short term.

- **Implementability:** Implementation of the re-injection end-use option under the Amended Remedy would be somewhat more complex than delivery of the treated water to LADWP. However, if delivery of the water to LADWP for use as drinking water is not possible, the re-injection end use will be essential to the successful remedy implementation.

2.7.5 Preference for Treatment as a Principal Element

Under either end-use option, the Amended Remedy will treat VOCs, chromium, and other emerging contaminants in the extracted groundwater. By utilizing treatment as a significant element of the remedy, the statutory preference for remedies that employ treatment as a principal element is satisfied.

2.7.6 Five-Year Review Requirements

Under either end-use option, the Amended Remedy will result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure. Therefore, a statutory review will be conducted within 5 years after initiation of remedial action to ensure that the Amended Remedy is, or will be, protective of human health and the environment.

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Part 3

Responsiveness Summary

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Part 3 – Responsiveness Summary

The purpose of this Responsiveness Summary is to provide a summary of EPA's responses to comments received from stakeholders and the public on EPA's "*North Hollywood OU Proposed Plan to Amend Groundwater Record of Decision*" dated May 1, 2013. During the public meeting held on June 5, 2013, EPA provided verbal clarifications to questions about the Proposed Plan. The proceedings of the public meeting were transcribed by a court reporter and are included in the Administrative Record.

During the public meeting, EPA received comments from three members of the audience. During the public comment period, EPA received one e-mail from a community member and two letters from stakeholders with comments on the Proposed Plan. EPA is required to consider and address only those comments that are pertinent and significant to the remedial action being selected. EPA is not required to address comments which pertain to the allocation of liability for the remedial action, nor potential enforcement actions to implement the remedial action, as these are independent of the selection of the remedial action and EPA's Proposed Plan. EPA does have the discretion to address comments with limited pertinence if doing so would address the concern of a significant segment of the public.

A summary of the major issues raised by commenters is presented in the following subsections of this Responsiveness Summary. Each comment received by EPA during the comment period, together with EPA's responses, can be found in Appendix A.

3.1 Stakeholder Issues

Issues raised by community members during the public comment period included a question about performance standards for the re-injection end-use option, a concern that air-stripping treatment might discharge chromium into the atmosphere, a preference that groundwater contamination be cleaned quickly, and a preference for implementing the re-injection option to store groundwater for future use.

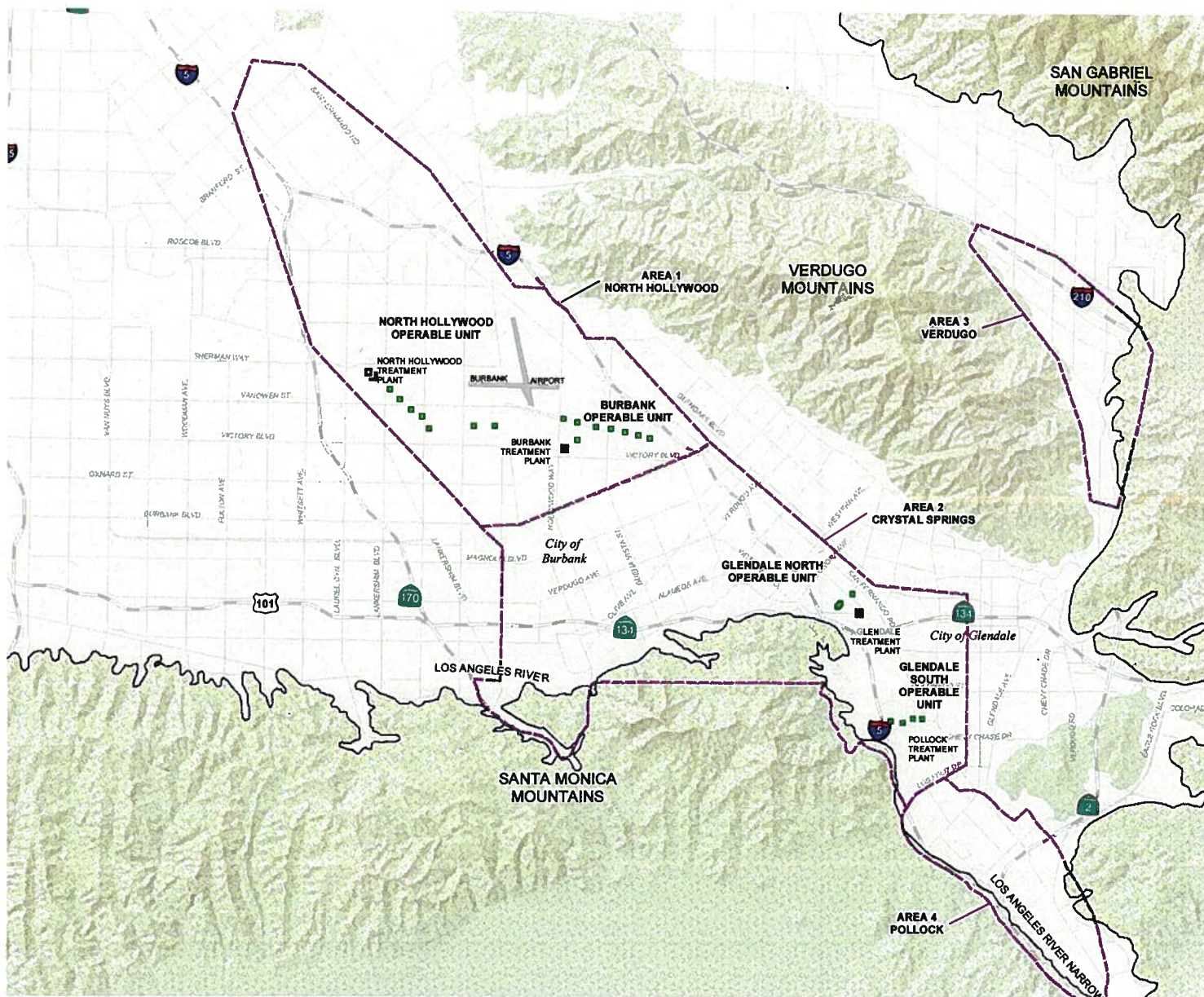
The engineering consultants performing RD activities for the NHOU PRP group submitted three comments on behalf of the PRPs. The comments included support of re-injection as an alternative end-use option for the Amended Remedy, a request for further clarification of when the re-injection option would be acceptable to implement, and a statement in support of selecting the specific configuration of injection wells and other infrastructure during the RD process.

LADWP submitted 23 comments, many of which consisted of requests for additional details regarding how the re-injection option would be evaluated, implemented, operated, and monitored. Most of those details are presented in the FFS, the 2009 ROD, and this RODA, or will be provided during the RD process. Similar to the PRP group's consultants, LADWP requested clarification of when the re-injection option would be acceptable to implement. LADWP also requested more information regarding the performance standards that would apply to the re-injection option (more details regarding performance standards are presented in this RODA).

Figure 1. The effect of the concentration of the solution on the rate of the reaction.

Figures

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- LEGEND**
- OPERABLE UNIT EXTRACTION WELL (OPEN SYMBOL IF INACTIVE)
 - OPERABLE UNIT GROUNDWATER TREATMENT PLANT
 - APPROXIMATE BOUNDARY OF INVESTIGATION
 - AREAS FOR SAN FERNANDO VALLEY SUPERFUND SITES



FIGURE 1
LOCATION MAP
SAN FERNANDO VALLEY SUPERFUND SITES

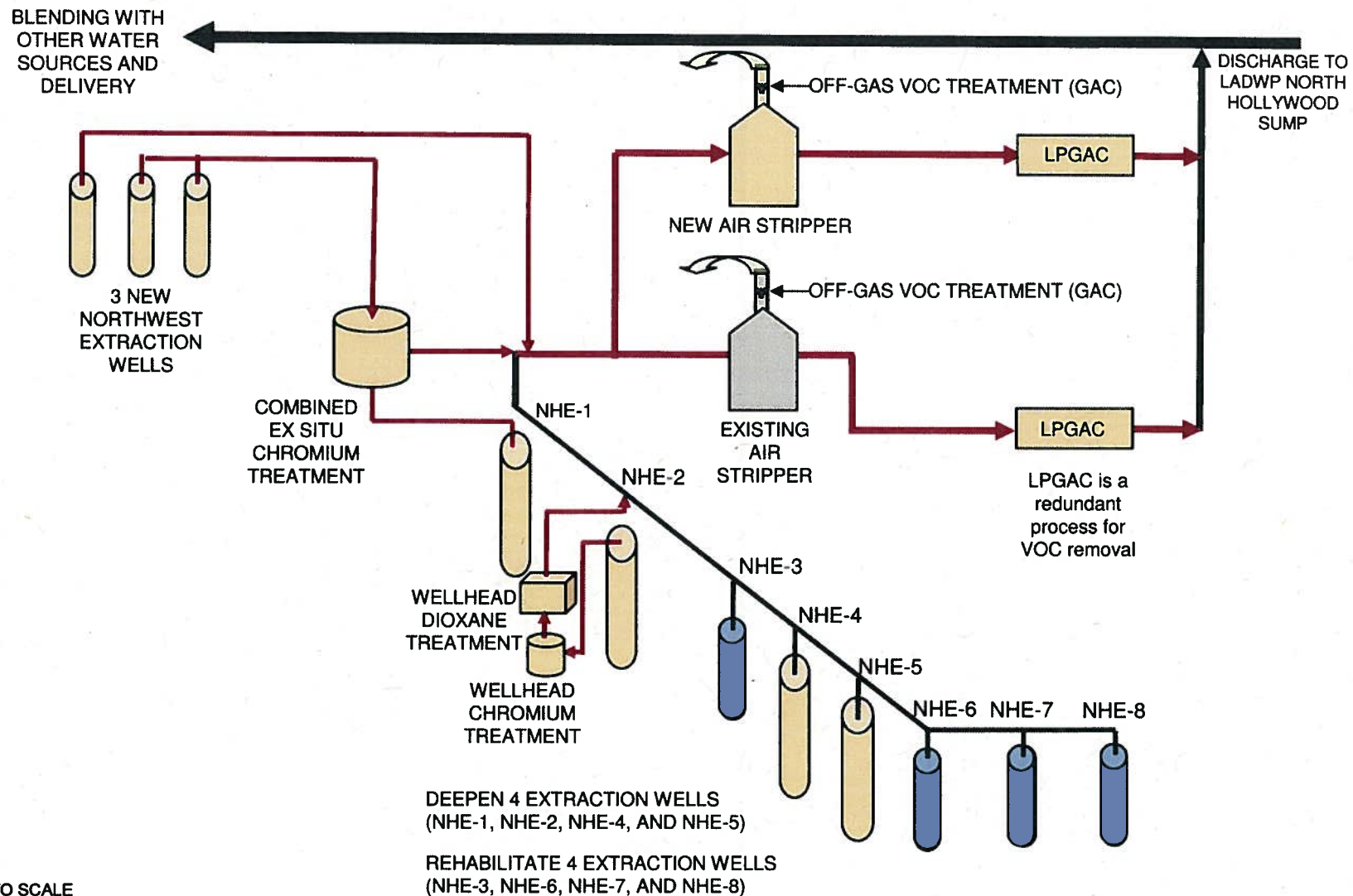


FIGURE 2
SCHEMATIC LAYOUT OF SELECTED
REMEDY WITH LADWP DELIVERY
END-USE OPTION (ALTERNATIVE 4a)
SAN FERNANDO VALLEY SUPERFUND SITES

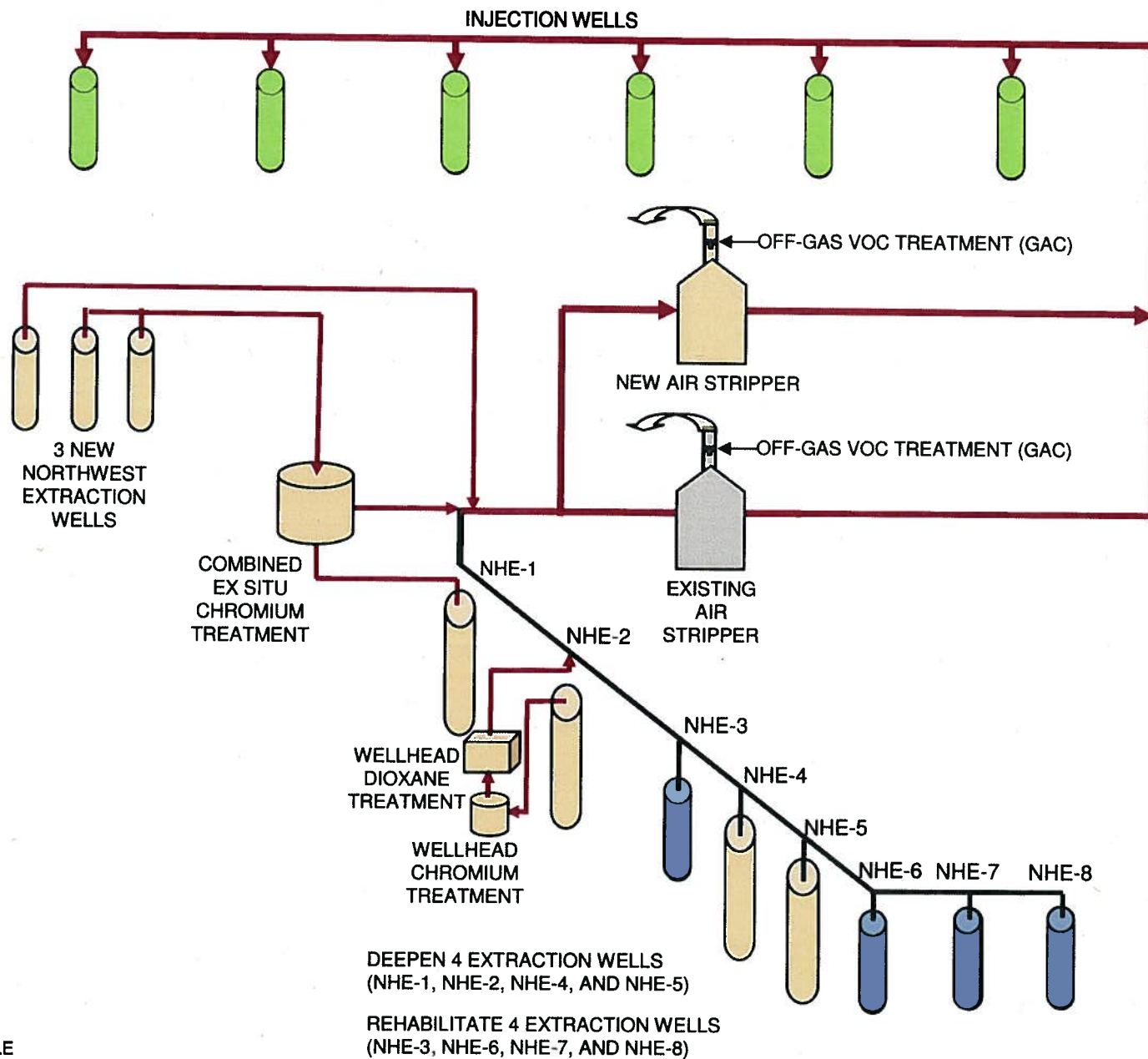


FIGURE 3
SCHEMATIC LAYOUT OF SELECTED
REMEDY WITH REINJECTION
END-USE OPTION (ALTERNATIVE 4b)
 SAN FERNANDO VALLEY SUPERFUND SITES

- LEGEND**
- △ CONCEPTUAL LOCATION OF PROPOSED NHOU INJECTION WELL (IF REINJECTION END-USE SELECTED)
 - ⊠ PROPOSED NHOU EXTRACTION WELL
 - ⊕ EXISTING NHOU EXTRACTION WELL
 - EXISTING ACTIVE PRODUCTION WELL
 - ▼ EXISTING FACILITY MONITORING WELL
 - EXISTING REMEDIAL INVESTIGATION MONITORING WELL
 - VOC TARGET VOLUME (µg/L)
 - CHROMIUM TARGET VOLUME (µg/L)
 - EXISTING NHOU EXTRACTION WELL COLLECTOR PIPELINE
 - PROPOSED NHOU EXTRACTION WELL COLLECTOR PIPELINE
 - CONCEPTUAL LOCATION OF PROPOSED NHOU INJECTION WELL DISTRIBUTION PIPELINE (IF REINJECTION END-USE SELECTED)

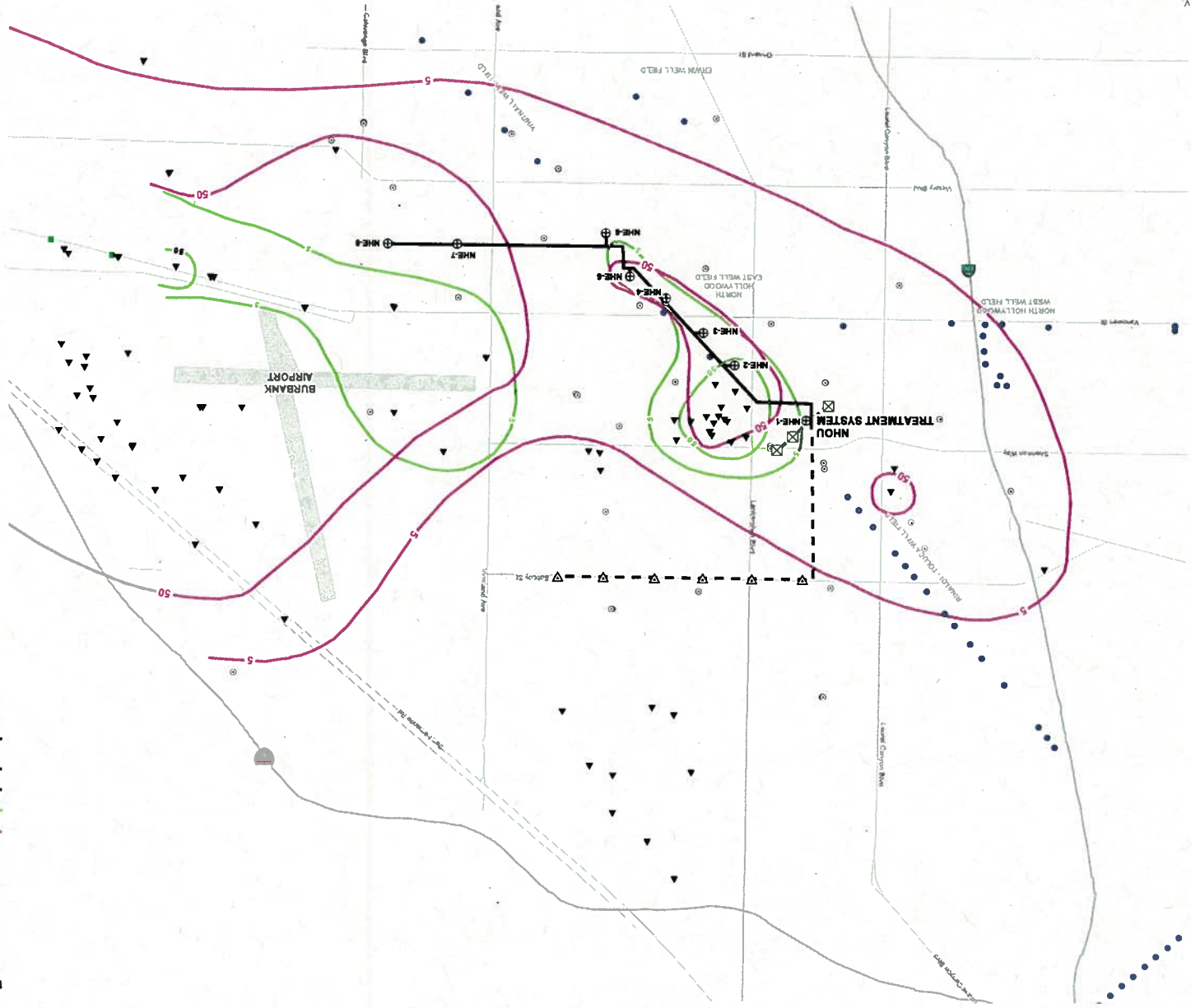


FIGURE 4
LOCATIONS FOR PROPOSED COMPONENTS
OF THE AMENDED REMEDY
SAN FERNANDO VALLEY AREA 1 SUPERFUND SITE

Appendix A

Detailed Response to Technical Comments

Following is the EPA response to the comments received on the Proposed Plan ("Plan") to amend the 2009 Interim Action Record of Decision ("2009 ROD"). The NCP requires EPA to summarize significant comments, criticisms, and relevant information submitted during the public comment period and to respond to each significant issue raised. Although EPA is not required to re-print the public comments verbatim, in many cases in this response summary EPA has included large segments of the original comments. Persons wishing to see the full text of all comments should refer to the commenters' submittals to EPA, which are included in the Administrative Record.

Specific comments (and responses by EPA) are numbered for convenient reference. The comments are numbered sequentially through the Response Summary, without reference to the specific commenter. Comments are shown in normal text, and EPA responses are shown in italics.

Verbal comments received by EPA during June 5, 2013, public meeting

Note: the following verbal comments, which were provided during the public meeting, were transcribed by a court reporter.

1. For re-injection, how will the treatment levels be set for the constituents that have only state notification levels?

Response: As discussed in EPA's 2009 Focused Feasibility Study ("FFS") for the NHOU Second Interim Remedy and the 2009 ROD, cleanup levels for the re-injection end-use option would be established during remedial design ("RD") based on the injection locations. Under the re-injection end-use option, removal of constituents that only have notification levels would need to comply with the California Antidegradation Policy. The treatment levels would be dependent on the location(s) ultimately selected for re-injection, and the locations would be selected such that re-injection would not degrade groundwater quality at the injection location(s).

2. I am aware that the utilities or clean water producing systems, they try to go to the lower zone because the lower zone is not contaminated. So they don't use the -- they don't use -- your goal is different from their goal. Your goal is to take the contaminants and clean the underground source. Your goal is different. But their goal is different from yours. Their goal is to go deeper; find cleaner, less caustic treatment of water. That's clear, right? But -- you do not -- with the facilities that we have, with the computer that we have and all this, you can't generate the plume containment. How is it progressed this year from the year before? Is this containment? So spending so much money up to now, what's the result of our spending so much money? So to make it short, that this -- this project should be looked over with more experts, people who know how to do it, what to do it. And the goal is not having good

quality, good water. Shortage of water in this valley. You know about that. There is shortage of water. One drop of water is very important. But the goal is not that. The goal is to clean the underground. That's it. It's not clean.

Response: The Remedial Action Objectives ("RAOs"), or goals, of the Amended Remedy are stated in the Proposed Plan, and include:

- ***Contain areas of contaminated groundwater that exceed the MCLs and notification levels to the maximum extent practicable.***
- ***Prevent further degradation of water quality at the Rinaldi-Toluca and North Hollywood West production wells by preventing the migration toward these well fields of the more highly contaminated areas of the VOC plume located to the east/southeast.***
- ***Achieve improved hydraulic containment to inhibit horizontal and vertical contaminant migration in groundwater from the more highly contaminated areas and depths of the aquifer to the less contaminated areas and depths of the aquifer, including the southeast portion of the NHOU in the vicinity of the Erwin and Whitnall production well fields.***
- ***Remove contaminant mass from the aquifer.***

As noted in the Proposed Plan, The First Interim Remedy (designed in 1986) has limited contaminant migration and removed contaminant mass from groundwater in the NHOU. However, new contaminants of concern have been identified in the NHOU, primarily hexavalent chromium and 1,4-dioxane, and changing groundwater conditions in the aquifer and the discovery of VOC contamination in new areas of the aquifer beneath North Hollywood limit the ability of the First Interim Remedy to fully contain the VOC plume. RD of the Second Interim Remedy is currently underway, as required by the 2009 ROD, and is being conducted by experts in the fields of hydrogeology and engineering, under the oversight of EPA. EPA fully expects the Amended Remedy to improve plume containment, as well as achieve the other RAOs. System startup and operations will be monitored by EPA, and reviews of the effectiveness of the Amended Remedy will be periodically conducted until all RAOs have been met.

3. To me, it appears that you're converting a contaminated system in the liquid state into an air pollution problem. You're drawing contaminants and putting it into the air. Presently, I am not affected by the water -- contaminants in the water. But being in this region, and if you put it into the air, I am affected. Let me point out that with respect to chromium, it's in the water phase. And if you're air stripping, the air that strips the VOC out becomes saturated with the very water that contains it. The chromium becomes a vapor. You're not doing -- you're not stopping the chromium from leaving the air stripper.

Response: As noted in the Proposed Plan, the Amendment to the 2009 Interim Action Record of Decision ("RODA") (which contains identical treatment components as the selected remedy in the 2009 ROD) includes treatment processes to remove chromium from groundwater withdrawn by extraction wells with elevated chromium concentrations before that water is treated for VOCs. Therefore, most of the chromium would be removed before entering an air stripper. To expand on the comment above, the air stripping process transfers VOCs from the aqueous phase (dissolved in water) to the vapor phase (as a gas

mixed with the passing air stream). The target VOCs in solution (such as trichloroethylene ("TCE") and tetrachloroethylene ["PCE"]) have relatively high Henry's Law constants, indicating that they are readily removed from water by the air-stripping process. In the First Interim Remedy and the Amended Remedy, the "stripped" VOCs are captured by granular activated carbon filters before the air is discharged to the atmosphere. Chromium is not a VOC—rather, it is a metal, which occurs in the dissolved phase as a cation or, more commonly in groundwater, as an oxyanion (combined with oxygen). At standard temperature and pressure, chromium cannot form a vapor phase like TCE or PCE, and its Henry's Law constant is effectively zero, meaning that it remains dissolved in liquid water. Therefore, the limited quantities of chromium that would reach the air stripper in the Amended Remedy would not volatilize and enter the air stream as a vapor.

E-mailed comment received by EPA during public comment period

1. Even though it will cost more money I am in favor of re-injecting water into the East Valley aquifer to help dilute the pollutants that now exist so that the aquifer can be used as a water reserve for LA's future. This last part is most important.

Response: As noted in the Proposed Plan, the RODA allows two end-use options for the treated water from the Amended Remedy: (1) delivery to LADWP to meet its municipal supply needs, or (2) re-injection to the aquifer. If the treated water is delivered to LADWP, less pumping may be required by LADWP at other production well fields in the eastern SFV to meet its water-supply needs, resulting in an equal impact on the future water supply in Los Angeles compared to the re-injection option.

Comments received by EPA via letter during public comment period

1. The proposed amendment of the Second Interim Remedy to add the option to re-inject groundwater extracted from the North Hollywood Operable Unit ("NHOU") extraction wells is important and should be incorporated into the Record of Decision ("ROD"). As EPA notes, it is a necessary option because it may not be possible to achieve a drinking water end use. Moreover, re-injection of treated groundwater for aquifer recharge or as a component of a recirculating treatment system constitutes beneficial use of such treated water. Having a re-injection option for managing extracted groundwater will provide additional flexibility to design a remediation system that can meet the ROD and stakeholder interests in a manner that will achieve the remedial action objectives ("RAOs") efficiently and cost-effectively. The re-injection option does not prevent full consideration of using the treated water in the end as a drinking water supply for the Los Angeles Department of Water and Power ("LADWP") in the remedial design process. Indeed, the proposed configuration of the Second Interim Remedy, including extraction and/or injection wells and transfer of treated water to the LADWP, as appropriate, will be considered as part of the Groundwater Modeling Memorandum and subsequent design packages.

Response: As noted in the Proposed Plan, the RODA will allow the re-injection of the treated water if EPA determines that delivery of the water to LADWP is unachievable. Based on the information currently available, EPA believes the Amended Remedy meets the threshold criteria and balances the trade-offs between competing interests at the NHOU.

2. The Proposed Plan states that re-injection of the treated water would be the preferred option if the option to deliver the water to LADWP is thoroughly explored and deemed impractical. While the Proposed Plan does not specify what conditions would deem the drinking water end use impracticable, an option that involves injection or a combination of injection and drinking water end use that achieve the RAOs in a manner that is more easily and effectively implemented than a drinking water end option should be acceptable. We recommend that EPA clarify its standard for when the re-injection option will be acceptable.

Response: EPA believes that delivery of treated groundwater to LADWP makes the most sense from a resource perspective. If LADWP and the NHOU Potentially Responsible Parties ("PRPs"), after negotiating in good faith, (1) have not come to an agreement on the terms for the delivery/acceptance of treated groundwater that satisfies EPA that the remedy will be able to operate reliably and effectively and (2) such an agreement has not been reached sufficiently far in advance of completion of design so that it can be incorporated into a final design, EPA will make the decision to proceed with re-injection as the end use so that the remedy can be implemented.

3. The Proposed Plan refers to the re-injection scenario presented in the 2009 Focused Feasibility Study, which included an estimated six injection wells and nine additional monitoring wells, noting that the injection wells would most likely be located north (up gradient) of the NHOU extraction wells. The 2011 Agreement and Order on Consent ("AOC") accounts for flexibility within the Record of Decision ("ROD"), which acknowledges that "further evaluation of specific pumping rates and extraction well locations will be performed during Remedial Design ("RD") to ensure that implementation of the Second Interim Remedy will not cause additional degradation of the aquifer." Additionally, the ROD states that "if new data collected prior to or during RD indicates that a different configuration of extraction wells is more effective and cost effective than the configuration described in the Proposed Plan, then that different configuration will be considered for implementation as part of the Second Interim Remedy." Given that re-injection would be an integral component of the Second Interim Remedy that could have a significant influence of the hydraulics of groundwater in the containment zone, we anticipate that the actual re-injection configuration will be determined during development of the RD.

Response: EPA concurs that the actual re-injection configuration will be determined during the RD phase of implementation of the Amended Remedy.

4. LADWP's comments only focus on the proposed amendment of allowing re-injection of treated water back into the San Fernando Basin ("SFB") groundwater as a preferred alternative, and it is not intended to modify LADWP's prior comments submitted as part of the 2009 ROD review and approval process.

Response: Comment noted—LADWP's comments on the 2009 ROD, together with EPA's responses, are included in Appendix A of the 2009 ROD.

5. The USEPA has indicated previously that re-injection is not the preferred end use, but rather that remediation of the groundwater and delivery to LADWP is preferred.

Response: As noted in the Proposed Plan, EPA has concluded that re-injection of all extracted groundwater might be necessary if LADWP and the NHOU PRPs are unable to reach an agreement that is acceptable to EPA regarding terms/criteria for delivery and acceptance of the treated water. EPA believes that delivery of treated groundwater to LADWP makes the most sense from a resources perspective, but recognizes that water delivery requires a complex agreement between LADWP and the NHOU PRPs that is acceptable to EPA. In the absence of such an agreement, the remedy can only be successfully implemented if the treated groundwater is re-injected into the aquifer.

6. After thorough review of the referenced and provided information, LADWP was unable to determine the implementability and effectiveness of the proposed re-injection alternative. Summarized in this letter is additional information that is needed to determine the viability of the proposed re-injection in order to consider it as a viable alternative for containment, remediation, and removal of contaminants from the SFB (San Fernando Basin) groundwater. To be considered viable and effective, this option should also be able to prevent the continuing escape and migration of contaminants into other areas of the SFB aquifer.

Response: As set forth in the FFS and 2009 ROD, the Amended Remedy provides the same level of protection to human health and the environment whether the end use for extracted water is delivery to LADWP for drinking water supply purposes or re-injection of all extracted water into the Basin. If delivery of the water to LADWP for use as drinking water is not possible, the alternate end use will be essential to the successful remedy implementation and, therefore, to protect human health and the environment.

7. The USEPA has not provided a defined process which may be used for deciding to exercise the re-injection option. The USEPA should provide information about its decision process, including, but not limited to, information about the following considerations:
- What are the criteria for deciding that LADWP and the Potentially Responsible Parties ("PRPs") are unable to reach an agreement in good faith?
 - What is the recommended process and objective criteria for evaluating the reasonableness of the "terms/criteria" being negotiated?

Response: EPA believes that delivery of treated groundwater to LADWP makes the most sense from a resource perspective. If LADWP and the NHOU PRPs, after negotiating in good faith, (1) have not come to an agreement on the terms for the delivery/acceptance of treated groundwater that satisfies EPA that the remedy will be able to operate reliably and effectively, and (2) such an agreement has not been reached sufficiently far in advance of completion of design so that it can be incorporated into a final design, EPA will make the decision to proceed with re-injection as the end use so that the remedy can be implemented.

8. The USEPA has not provided information that will ensure the re-injection end use satisfies all primary objectives for a preferred alternative as defined in the 2009 Focused Feasibility Study ("FFS") and 2009 ROD, such as but not limited to:

- Vertical and horizontal containment of contaminant concentrations which exceed the federal and state Maximum Contaminant Levels (“MCLs”) and Notification Levels (NLs) for all constituents of concern (“COCs”) which have been detected within the groundwater proximal to the NHOU and LADWP's various groundwater production wellfields,
- Groundwater extraction and re-injection flow rates of approximately 5,000 acre feet per year (“AF/Y”), and
- The deepening of existing wells and establishing of new extraction and re-injection wells.

Response: As set forth in the FFS and 2009 ROD, the Amended Remedy provides the same level of protection to human health and the environment whether the end use for extracted water is delivery to LADWP for drinking water supply purposes or re-injection of all extracted water into the Basin. The actual configuration of extraction and re-injection wells will be determined during the RD phase of implementation of the Amended Remedy.

9. The USEPA has not provided the Performance Standards for the re-injection end use option. The proposed amendment states that such standards will be established later, during the remedial design process based on the COC concentrations in the groundwater at the injection well location(s). What process will the USEPA use for establishing these Performance Standards?

Response: As described in the Proposed Plan, in the scenario where the contaminant of concern (“COC”) is already at levels higher than MCLs in the aquifer, then the basis for a performance standard will be (at a minimum) MCLs (federal or State). In the scenario in which a given constituent is present at lower levels than the MCL, then the re-injected water must be treated in a manner consistent with the California Antidegradation Policy requirements.

10. The USEPA has not provided any requirements for how PRP's will demonstrate compliance with California's Anti-degradation Policy. In question are:
- How will re-injection of contaminated groundwater back into the aquifer be prevented in the event of malfunction with the treatment plant?
 - What monitoring processes and frequencies will be in place to ensure full compliance?
 - What enforcement mechanisms will be imposed for any violations which may occur?
 - How will the USEPA respond to and recover any contaminants which may have been re-injected into the aquifer?

Response: The RD effort will include development of a Pre-Achievement Operations and Maintenance (“O&M”) Plan describing actions to be taken to avoid re-injection of contaminated water and response actions in case of a plant failure. The Pre-Achievement O&M Plan will also include a Compliance Monitoring Sampling and Analysis Plan.

11. The USEPA has not provided proposed locations for any re-injection wells. How will the USEPA identify candidate sites, and what process will be used to evaluate and screen for appropriate and suitable locations for re-injecting the treated groundwater?

Response: As described in the FFS, six injection wells were assumed to be located north (upgradient) of the NHOU extraction wells. In this configuration, the treated groundwater would be re-injected into the aquifer at the northern boundary of the VOC and chromium plume, and supplement the hydraulic gradient driving contaminated groundwater toward the extraction wells. The actual re-injection configuration will be determined during the RD phase of implementation of the Amended Remedy, considering effects that the injection wells are forecast to have on groundwater quality at the re-injection location, as well as forecast hydraulic containment of contaminated groundwater in the NHOU.

12. In this proposed amendment, the USEPA has not provided its evaluation of the potential adverse effects caused by re-injection to the aquifer.
- Groundwater mounding as a result of re-injection may liberate unknown contaminants which are currently trapped within the unsaturated zone of the soil matrix. Raising the water table as a result of re-injection would saturate the lower vadose zone, potentially leaching Volatile Organic Compounds (“VOCs”) and other contaminants into the shallow groundwater.
 - The re-injection of treated groundwater may also potentially cause spreading of the contaminant plume to other parts of the SFB where extraction and treatment systems are not in place.
 - How will the USEPA identify the potential for these situations at each re-injection; what analytical process will be utilized (such as groundwater modeling), and how will these situations be evaluated, monitored, and prevented during the implementation phase?

Response: A detailed analysis of effects of re-injection will be conducted during the RD effort. The RD effort includes pre-design groundwater modeling, which will be used by EPA to identify potential issues with re-injection and to modify the re-injection configuration as necessary before and during the RD process. If re-injection is selected as the end-use option, the Pre-Achievement O&M Plan will be developed during the RD process and will include a Compliance Monitoring Sampling and Analysis Plan that will incorporate monitoring of impacts of re-injection. Implementation of the Amended Remedy will be required to meet performance standards and RAOs.

13. The USEPA should disclose more information and details about the plans for the re-injection alternative before concluding that this end use provides for the Overall Protectiveness of Human Health and the Environment.

Response: As noted in the FFS and 2009 ROD, the Second Interim Remedy (and Amended Remedy) will protect human health and the environment by achieving, to the extent practicable, hydraulic containment of groundwater exceeding the MCLs, including the most significant areas of groundwater contamination in the NHOU, thereby preventing the highest contaminant concentrations from migrating to the nearby Rinaldi-Toluca and North Hollywood West production wells. The Amended Remedy’s VOC treatment components will remove the VOCs and other treatment components will remove emerging contaminants of concern (including hexavalent chromium and 1,4-dioxane) to the performance standards identified in this RODA. Water supply wells, NHOU extraction wells, EPA remedial investigation monitoring wells, and facility monitoring wells will be

monitored, and access to contaminated groundwater will be restricted through institutional controls ("ICs"). These goals will be achieved under either end-use option included in the Amended Remedy.

14. The USEPA has not provided its identification and evaluation of any risks which may remain after the long-term implementation of the re-injection alternative. There may be risks associated with remaining sources of contamination in the extraction areas or contaminant residuals which pass through the treatment process and back into the aquifer by way of re-injection.

Response: The plans for groundwater extraction under both the LADWP-delivery and the re-injection end-use options are identical; therefore, risks associated with remaining sources of contamination in the extraction areas are expected to be identical (see previous response to comment for more detail). As discussed in the FFS for the NHO Second Interim Remedy and the 2009 ROD, cleanup levels for the re-injection end-use option would be established during the RD phase based on the injection locations. As described in the Proposed Plan, in the scenario where the contaminant of concern ("COC") is already at levels higher than MCLs in the aquifer, then the basis for a performance standard will be (at a minimum) MCLs (federal or State). In the scenario in which a given constituent is present at lower levels than the MCL, then the re-injected water must be treated in a manner consistent with the California Antidegradation Policy requirements.

15. The USEPA has not provided any evaluation for adequacy and reliability of critical technology controls. This should address the degree of confidence that such vital controls may fail and uncertainties with re-injection water that may still contain wastes. Risks and difficulties associated with the long-term management and maintenance strategies should be discussed to ensure the re-injection alternative remains viable and effective over the life of the remedy. This would include reviewing the potential need for replacement re-injection wells or moving the re-injection to new locations.

Response: The RD effort will include development of a Pre-Achievement O&M Plan describing system controls and equipment, routine operating activities, routine maintenance activities, well rehabilitation requirements, emergency operating activities, and other procedures required to keep the Amended Remedy, including the re-injection components (if necessary), operating effectively for the long term.

16. The USEPA must disclose more information about the risks associated with plans for the re-injection alternative before concluding that this end use provides for the Long-term Effectiveness and Permanence.

Response: As discussed in EPA's FFS for the NHO Second Interim Remedy and the 2009 ROD, the Second Interim Remedy (and the Amended Remedy) will permanently remove VOCs, 1,4-dioxane, and chromium from extracted groundwater under either end-use option. Implementation of the ICs is intended to ensure that this alternative prevents the continued migration of contaminants and remains protective in the long term.

17. The determination of whether the proposed amendment considers the ability of the alternative's use of treatment to reduce the harmful effects of principal contaminants, their ability to move in the environment, and the amount of contamination present cannot be

properly evaluated. Significantly more information about details of the re-injection alternative end use must be disclosed and certain analysis must be completed before concluding that the proposed amendment provides for a Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment. The proposed amendment must layout some acceptable parameters for an appropriate evaluation. Such disclosure should provide for, at a minimum, the same information requested in our general comments above.

Response: As discussed in the FFS for the NHOU Second Interim Remedy and the 2009 ROD, the Second Interim Remedy (and Amended Remedy) will permanently remove VOCs, 1,4-dioxane, and chromium from extracted groundwater under either end-use option.

18. The USEPA has not provided a full analysis of the time needed to implement the re-injection alternative, in light of the various concerns and information needed to adequately define the project, evaluate the effectiveness, implementability, and associated risks and impacts related to the re-injection end use.

Response: The FFS and 2009 ROD included evaluation of the short-term effectiveness of the re-injection end-use option under the Preferred Alternative (Alternative 4b). Construction of the injection wells, additional pipelines, and additional monitoring wells required for the re-injection option may require an additional 6 to 12 months to implement. Ultimately, if re-injection is implemented as the end-use option, a new schedule for implementation will be developed as part of the RD process.

19. In evaluating implementability, the USEPA must address both the technical and administrative feasibility of implementing a technology process or remedy from design through construction and operation, including the availability of services and materials needed to implement a particular option and the need for coordination with other governmental entities. Significantly more information about details of the re-injection alternative end use must be disclosed and certain analysis must be completed before the alternative end use is declared as a preferred alternative. The proposed amendment must layout some acceptable parameters for an appropriate evaluation. Such disclosure must provide for, at a minimum, the following to determine both technical implementability and administrative implementability:
- Given that sites have not yet been identified, it is difficult to fully assess the relevant issues affecting construction and operation of the re-injection end-use option. The installation of conveyance pipelines between the Second Interim Remedy treatment plant and each of the re-injection wells will require PRPs to secure pipeline franchises from the City of Los Angeles. PRPs would need to obtain all necessary easements, right of ways, water rights, and real property identified for accommodating the pipeline alignments, booster pump stations, electrical power services and controls infrastructure, and space to be utilized during the operations and maintenance phase. None of this is discussed in the proposed amendment.

Response: The FFS and 2009 ROD included evaluation of the implementability of the re-injection end-use option under the Preferred Alternative (Alternative 4b). The injection wells required under Alternative 4b can be difficult and costly to operate and maintain, and the time required for planning, permitting, and construction of the re-injection

infrastructure would likely be greater than the time required for implementation of delivery of the water to LADWP (the existing end-use). However, if delivery of the water to LADWP for use as drinking water is not possible, the alternate end use will be essential to the successful remedy implementation and, therefore, to its implementability. If re-injection is implemented as the end-use option, additional information regarding planning, permitting, and construction requirements will be included in the RD documents.

20. The USEPA has not provided any criteria or information that discusses the technical aspects of the re-injection end use, such as:

- What technical reliability issues are being considered as part of evaluating the re-injection end-use option?
- Are the potential failure modes and risks known, and how will system operations respond if there was a sudden failure with one or more re-injection wells, a treatment plant component, or a pipeline break?

Response: The RD documents will discuss technical reliability concerns and ways to mitigate them. The Pre-Achievement O&M Plan will include emergency operating activities, an assessment of potential equipment or control failures, and a compliance monitoring sampling and analysis plan.

21. The USEPA must outline its requirements and mitigation for the consequence of re-injection water picking up contaminants due to groundwater flow and gradients.

Response: If re-injection is selected as the end-use option, additional evaluation of groundwater quality and potential source areas in the vicinity and downgradient of the planned injection wells will be conducted to reduce the potential risk of raising contaminant levels in previously uncontaminated areas of the aquifer.

22. Based on the information provided, it is not possible to determine whether migration or exposure pathways can be adequately monitored since the proposed locations of the re-injection wells were not specified.

Response: It was assumed in the FFS that nine additional monitoring wells would be installed in the area of the injection wells to monitor groundwater levels and water quality in the vicinity of the new injection wells. More than nine additional monitoring wells will be installed if deemed necessary during the RD process, in order to adequately monitor the re-injection option. The locations for the injection wells and associated monitoring wells will be selected during the RD process.

23. The USEPA has not provided any information which describes the basic administrative issues such as, but not limited to:

- How will PRPs be required to demonstrate to the Los Angeles Regional Water Quality Control Board and California Department of Public Health their continuing compliance with the California Anti-degradation Policy (State Water Resources Control Board Resolution No. 68-16) and other Performance Standards, which are yet to be determined, so that the issue of implementability can be tested?

- What will be the USEPA's process for oversight, compliance, and enforcement, and how will it coordinate with LADWP and California's environmental regulators to participate in these functions, so that the issue of implementability can be tested?
- There is no indication as to what will be the process for involving the Upper Los Angeles River Area ("ULARA") Watermaster in the review and evaluation of the re-injection end-use option, including evaluation of appropriate re-injection locations and depths, review of modeling and analysis of effects on existing contaminant plumes, and agreement on systems and processes to allow for accurate accounting of operational losses of groundwater.
- There is no indication as to whether or not the PRPs can obtain the pipeline franchise agreements from the City of Los Angeles.
- In the 2009 ROD, the USEPA anticipated "additional administrative issues" for either end use (drinking water or re-injection) in regards to permitting and access requirements for new infrastructure. With the increased focus on re-injection as a preferred end use, it now seems the USEPA should update its analysis of the administrative challenges with more specifics. This will allow for a more detailed comparison of the challenges with permitting and access requirements, and to more appropriately weigh the major trade-offs between these two options.

Response: A Pre-Achievement O&M Plan will be developed during the RD process, which will include reporting requirements to demonstrate compliance of either end-use option with the RAOs for the Amended Remedy and ARARs established in the 2009 ROD and ROD Amendment.

The ULARA Watermaster will be provided with relevant RD documents and given an opportunity to review and comment, consistent with past practice at the NHO.

As noted in the FFS and 2009 ROD, new pipelines are required for extraction wells and (if re-injection is selected as the end-use option) injection wells under the selected remedy. Compliance with the substantive requirements of any applicable permitting process (including "franchise agreements") was anticipated by EPA under either end-use option and will be investigated in more detail during RD.

The re-injection end-use option was already considered and evaluated during the FFS as a potentially equally viable alternative to delivery of the water to LADWP as an end-use option. Alternative 4a (delivery to LADWP as the end-use option) was selected instead of Alternative 4b (re-injection as the end-use option) in the 2009 ROD as the Second Interim Remedy, primarily based on cost. The net present value ("NPV") of the re-injection option was estimated to be approximately \$26 million greater than the NPV of the LADWP-delivery option. However, if delivery of the water to LADWP for use as drinking water is not possible, the alternate end use will be essential to the successful remedy implementation. If the re-injection end-use option is implemented, analysis of the administrative details will be conducted during RD.

24. Availability of services and materials need to be considered as part of concluding whether the re-injection end-use option is feasible and can be implemented. The USEPA has not provided

any indication as to considerations for availability of treatment, storage capacity, and disposal services which will be dependent on the resources of the PRP operators.

- How were these components of the re-injection end-use option identified and evaluated?
- Can this evaluation component be provided for our additional review and comment?
- Have the necessary specialists, operations staff, and equipment required for implementing the re-injection end-use option been identified and evaluated?
- Has the availability of the prospective technologies been considered with regard to whether there are multiple vendors available to offer the required services and provide competitive bids, or whether technology is available to provide re-injection in the expected volume and flow rate of approximately 5,000 AF/Y?

Response: Identification and evaluation of the basic components of the re-injection end-use option were presented in the FFS. Design and cost assumptions are presented in Appendices C and D of the FFS. Although implementation of the re-injection end-use option would entail greater administrative and technical challenges than delivery to LADWP, re-injection of treated groundwater is not a new science or technology, and has been successfully implemented as an end-use technology at many other Superfund sites. EPA does not anticipate encountering difficulty finding appropriate staff and equipment or multiple vendors to implement the re-injection option, if it becomes necessary.

25. This evaluation includes estimated capital and annual operations and maintenance costs, as well as present worth cost. Present worth cost is the total cost of an alternative over time in terms of today's dollar value. Given that expected costs for the re-injection end use are nearly \$27 million more costly than the drinking water end use, the drinking water end use alternative is vastly superior to the option for re-injection end use.

Response: Alternative 4a (delivery to LADWP as the end-use option) was selected instead of Alternative 4b (re-injection as the end-use option) in the 2009 ROD for the Second Interim Remedy, primarily based on cost. The NPV of the re-injection option was estimated to be approximately \$26 million greater than the NPV of the LADWP-delivery option (NPV of \$134.2 million versus \$107.8 million). However, if LADWP and the NHOU PRPs are unable to reach an agreement that is acceptable to EPA regarding terms/criteria for delivery and acceptance of the treated water, implementation of the alternate end use will be essential to the successful remedy implementation, despite the cost difference.

26. The USEPA indicated that the California agencies have expressed their support for the USEPA's preferred alternative. LADWP appreciates the continued support and partnerships which have been developed over the recent decades with our environmental regulatory agencies at the federal and state levels. However, LADWP was not made aware of such support being provided by the California environmental regulators for the re-injection end-use option. Please provide any relevant documentation which has indicated the state's support for this proposed amendment and the information and criteria that were relied upon as a basis for providing support.

Response: In 2009, DTSC (the State lead agency for the NHOU) expressed support for EPA's Preferred Remedy in the FFS, which became the Selected Remedy in the 2009

ROD. A letter of support from DTSC for the Amended Remedy is included in the Administrative Record for the NHOU.

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